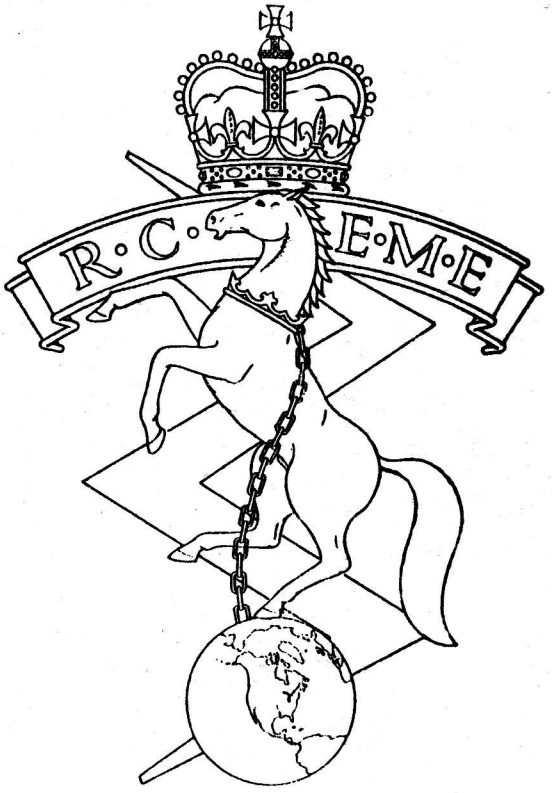
TECHNICAL BULLETIN



VOLUME 16 NUMBER 1

FINAL ISSUE

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EDITORIAL

Undoubtedly, you will have noticed by the cover that this is the "Final Issue" of the Technical Bulletin. Our readers have no doubt observed that in recent years The Technical Bulletin has not been published as often as it used to be. This situation has been brought about largely by the gradual dissolution of our former RCEME School. With the move from Kingston to Borden the editorial staff found itself facing a number of problems which made continued publication of the Technical Bulletin an impossibility. However, it is not our intention to dwell on these problems at this time.

It therefore, seems appropriate at this time to say a few words concerning the relatively young history of our Bulletin. The first edition of the "RCEME Quarterly" was published in 1949 under the auspices of the Directorate of Mechanical Engineering AHQ Ottawa. It was followed by the "RCEME Technical Bulletin", published and distributed by DEME. Responsibility for its publication eventually passed to the RCEME School in Kingston. With the advent of unification the publication dropped the letters "RCEME and became simply "The Technical Bulletin" as we know it today.

This "Final"Technical Bulletin contains most of the submissions received since our last edition; to those we could not accommodate in this issue because of our limited budget, our apologies. The editorial staff acknowledges the efforts of the Base Commander CFB Kingston, Colonel A.L. Maclean, without whom this "Final Issue" could not have been printed.

The only significant editorial message we wish to leave with you is our sincere hope that the maintenance community will recognize the value and need for a technical publication catering to all maintainers. If you would like to see this type of publication then don't hesitate to make your feelings known. We are confident that in the near future those in responsible positions will make every effort to fill the void created by the demise of the "TECHNICAL BULLETIN".

December, 1971

MOVE OF TRAINING FROM KINGSTON TO BORDEN

BY: LCOL K.R. JOSLIN CD

Shortly after the Canadian Armed Forces were integrated in 1966, Training Command Headquarters in Winnipeg commenced a series of studies with the aim of reorganizing the single service training facilities to effect economies and to develop the establishments needed to support the unified Canadian Forces Training System. Of these early studies the most important, from the then RCEME point of view, was COTT - Consolidation of Technical Training.

As time passed and further studies were conducted, CFSCLOE - The Canadian Forces School of Communications and Land Ordnance Engineering was formed in CFB Kingston by amalgamating the Army's RCEME and Royal Canadian Signals Schools.

During the winter of 1969-70, the COTT plan gave rise to a further study regarding the transfer of part of the old RCEME School to CFB Borden. The object of this study was to move the non-electronic or mechanical training and officer training to CFB Borden and into the accommodation occupied by CFATS - The Canadian Forces Aircraft Trades School. This training was to become part of the load of a new school to be formed by amalgamating the training companies moved from Kingston with the existing CFATS. This plan was approved in the spring of 1970 and on 1 June two new Schools were authorized, CFSAOE - The Canadian Forces School of Aerospace and Ordnance Engineering in CFB Borden, and CFSCEE - The Canadian Forces School of Communications - Electronics Engineering in CFB Kingston.

The initial accommodation study performed in CFB Borden showed that it was possible to accommodate the LORE Officer Training Company in CFSAOE with only minor renovation to existing accommodation. As a result of this the construction work required was completed and the LORE Officer Training Company moved from CFB Kingston to CFB Borden by 1 September 1970. The company is accommodated in World War II buildings which have been renovated to provide the type of accommodation required and which provide good facilities for officer training. The company has graduated one Phase 4 LORE Officers course since arriving in Borden and has a second course now in progress. It has also conducted minor courses for Land Maintenance Management Assistants.

The original study of the renovation required to accommodate the remainder of the training to be moved from Kingston was not acceptable and a second study was completed in the fall of 1970. This study has not yet been approved, although its chances of acceptance are high, and planning to complete the move from Kingston is proceeding on the assumption that it will be approved. All of the training which will be moved to Borden will be accommodated in buildings of post World War II construction except for one minor area. Part of the Metals Technician training will be conducted in a type of building which is a rarity in the Canadian Forces, a World War I Aircraft Hangar.

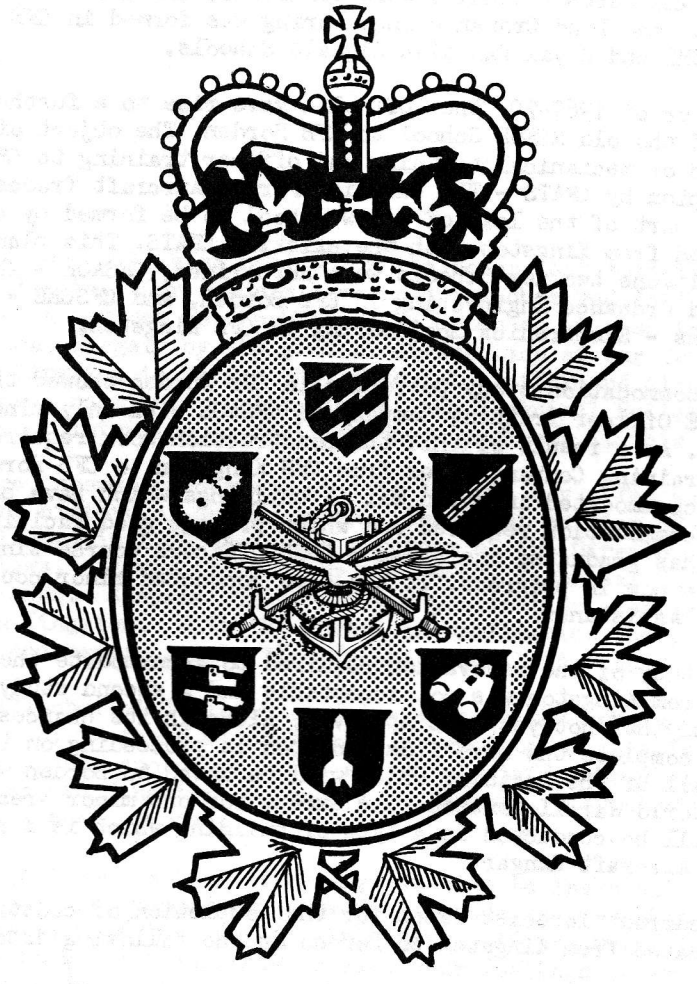
Based on the current forecast dates for the completion of construction in Borden, training will be relocated from Kingston to Borden on the following dates:

Weapons Technician (Land)	1 Jun 71
Metals Technician	1 Aug 71
Machinist, Electro-mechanical Technician and Vehicle Technician	1 Sep 71

This will accomplish the move to Borden of the mechanical training conducted by the old RCEME School. The electronic training previously conducted by the RCEME School will be conducted in CFSCEE in Kingston. The LORE Officer is charged with certain responsibilities for the repair of electronic equipment by the LORE Officer Classification Specification and to this end will still receive some of his training in Kingston.

Kingston was the home of the Corps of RCEME. With this move the land maintenance technicians in the Canadian Forces will not have a single home or a "corps" school since their technical training will be conducted by two schools. The Canadian Forces Training System will ensure that the technicians required to man an effective land maintenance system are provided by these two new schools.

HOW ABOUT A LORE BADGE?



SUBMITTED BY: MWO J.A. LASCELLES - CFHQ/CTS/DOM

MWO Lascelles feels that the technicians of the Land Maintenance organization should have some identifying mark to show (a) who we are and (b) what duties we perform.

The basic design was followed, with shields depicting all the tasks maintainers are required to perform.

LORE PHASE IV TRAINING - 1970

By: LT P.G. Whittingham - CFSAOE LOTC

Sulbalterns courses come and go, shortly to be forgotten. As RCEME goes, well, we no longer are - they call us LORE now; but save for a few Air element types (ex - RCAF, if you've forgotten already) on our course the Corps secretly lives on.

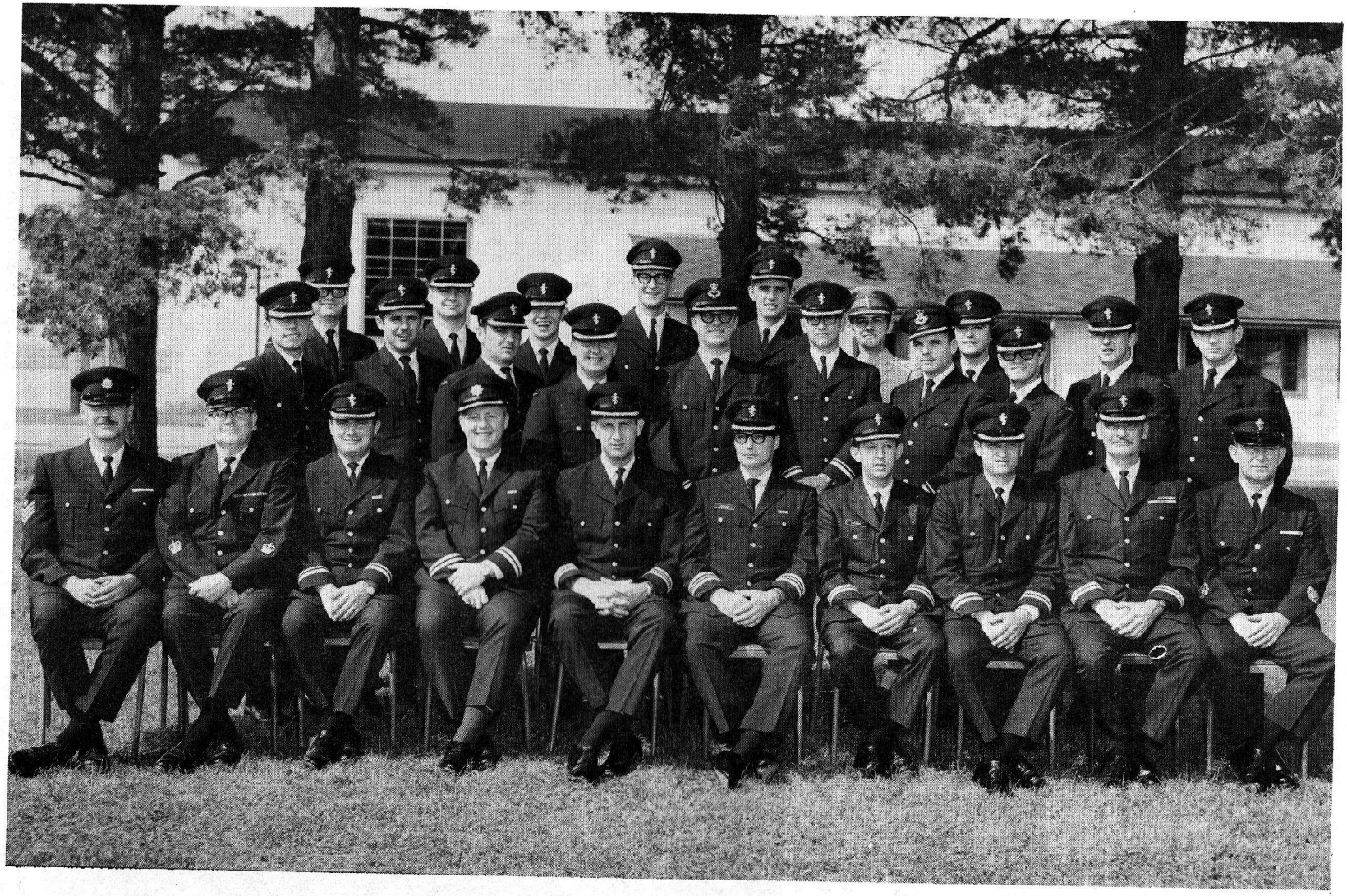
What makes LORE 7001 Phase IV more memorable than others? Well, maybe it was the two week field exercise in Petawawa which started on a Monday and ended three days later. The same week the FLQ problem arose. Perhaps it was a certain mid-course marriage and subsequent honeymoon tour of Kingston and 202 Wksp. Or could it be the close link that existed between students and staff which almost made this course enjoyable.

We learned a lot - tactics, staff duties, LMF, LMP, engineering and management; we toured a bit - LETE, TTC, 202, Petawawa; but most of all we geared ourselves for the jobs ahead.

From the rainy haven of Victoria to the fraulein charmed towns in Germany, we spread our talents. Thinly maybe but still, the product of this 1st LORE Phase IV course will calm those "old timers" who remember "the good old days of RCEME".

As for the Air element - they really can do it you know - what a shame to have had them waste their talents so long when Land Ordnance Engineering uses them so resourcefully (as RCEME Officers?).

LT Ralph Reich receives the RCEME Corps Sword, traditionally presented to the outstanding Officer on the RCEME/LORE Phase IV. BGen A. Mendelsohn made the presentation on the LORE Graduation Parade, December, 1970.



LORE OFFICER PHASE IV COURSE 7001 - 1970

1st Row: Sgt KA Prescott, WO GM Levesque, Lt RA Nickerson, Capt IE Patten, Major RN Fischer, Major LA Leflar, Capt PG Pothier, Capt JGC Dupont, Capt JR Hardy, MWO ME Stoney.

2nd Row: Lt G. Thibeault, Lt GA Walsh, Lt JM Leclerc, Lt JMP Berube, Lt GC Huntington, Lt RH Reich, Lt RJ Bradshaw, Lt DS Warren, Lt JZG Massicotte, Lt JDP Levesque.

3rd Row: Lt PG Whittingham, Lt RC Sochasky, Lt WS Tait, Lt KW Kirkland, Lt DB Parker, Lt JAR Guertin, Lt JL Leboeuf.

CFSAOE - LORE OFFICER TRAINING COMPANY INSTRUCTIONAL STAFF - FEB 1971

L to R seated: MWO ME Stoney, Capt JCG Dupont, Maj RN Fischer, LCOL KR Joslin, Maj PG Pothier, Capt JR Hardy
standing: Lt GC Huntington, Capt IE Patten, Capt FG Scagnetti, Sgt KA Prescott, Lt PG Whittingham,
WO GM Levesque, Lt RA Nickerson

SELF-FULFILLING PROPHECY - A KEY TO SUCCESS

(Reproduced from READERS DIGEST - Feb 69)

During the U.S. Open Tennis Tournament last summer, Lt. Arthur Ashe, the eventual winner, was asked how he managed to serve an ace so often when he needed it most: "Mainly I think it's because people expect you to," Ashe replied. "You've done it before and they think you can do it again. It's a kind of self-fulfilling prophecy."

You hear the term often these days. A mysterious force that operates in such diverse fields as politics, economics, athletics and international relations, it is a fact of everyday life: the tendency of certain kinds of predictions to bring about the conditions that make them come true. It is a force that each of us can personally tap to improve our lives.

Predicting rain or sunny skies doesn't affect tomorrow's weather, but a public-opinion poll predicting victory or defeat for a political candidate can have a definite effect on the outcome. Betting on the flip of a coin doesn't change the odds, but letting an athlete know that you have bet on him can considerably affect his performance.

"The essence of it is that one person's prediction of another person's behaviour somehow comes to be realized," says Harvard psychologist Robert Rosenthal. "The expectation is communicated to the other person, sometimes in unintended ways thus influencing his actual behaviour."

In a recent experiment, Rosenthal showed how the power of the self-fulfilling prophecy could be used to raise I.Q. scores. The question he asked himself was,"Do some children perform poorly in school because their teachers expect them to?" If so, Rosenthal surmised, then raising the teacher's expectations should raise the children's performance.

In a prelimin ary experiment, Rosenthal gave each of 12 psychology students five rats of the same strain. Half of the students were told that their rats had been bred for skill in running a maze. The other six students were told that their rats could be expected, for genetic reasons, to be poor at running a maze.

From the onset, the rats which were believed by their handlers to have the higher potential did, in fact, perform better ---while the rats which were thought to be dull sometimes failed even to start the maze. Yet the only difference between the two sets lay in the attitudes of their trainers.

How did the allegedly superior rats catch on to the fact that more was expected of them? "The students with the 'bright' rats gave their animals more attention and handled them more gently than did the students expecting poor performance," says Rosenthal.

He was now ready to try out his theory in actual classrooms. Kindergarten through fifth-grade pupils in a cooperating school were given a "new test of learning ability." The following September, after the tests were "graded," the teachers were casually given the names of five or six children in each new class who were designated as "spurters" possessing exceptional learning ability.

What the teachers didn't know was that the names had been picked in advance of the tests on a completely random basis. The difference between the chosen few and the other children existed only in the minds of the teachers.

The same tests taken at the end of the school year revealed that the spurters had actually soared far ahead of the other children, gaining as many as 15 to 27 I.Q. points. Their teachers described them as "happier than the other children, more curious, more affectionate and having a better chance of being successful in later life."

Again, the only change had been one of attitudes. Because the teachers had been led to expect more of certain students, those children came to expect more of themselves.

"The explanation probably lies in the subtle interaction between teacher and pupils," says Rosenthal. "Tone of voice facial expressions, touch and posture may be the means by which--often unwittingly--she communicates her expectations to her pupils. Such communication may help a child by changing his perceptions of himself."

Similar subtle interactions take place in every human encounter. In marriage for example, husbands and wives tend to fulfil one another's expectations, positive or negative. At social gatherings, certain individuals can be counted on to be brillant or wise--or the reverse--because this has come to be expected of them.

How do other people's expectations and opinions concerning us change our personalities and affect our behaviour? "The way we imagine ourselves to appear to another person is an essential element in our conception of ourselves," says New York University sociologist Robert Bierstedt. "In other words, I am not what I think I am, and I am not what you think I am. I am what I think you think I am."

This so-called looking-glass concept of the self was first proposed some 65 years ago by the pioneer sociologist Charles Horton Cooley. Cooley got the idea from something all of us have observed about ourselves: that different people bring out different traits in us. As Cooley noted, we are reluctant to be evasive with people who expect us to be straightforward, or cowardly with those who think of us as brave.

The knowledge that others believe in us and are counting on us acts as a self-fulfilling prophecy and helps us to become as good as they think we are. Leontyne Price, the greatest soprano, got her first job, as a maid, with a family who predicted that she had the making of a star--and made it a self-fulfilling prophecy by convincing Miss Price herself. When Roger Bannister began training to beat the four-minute mile, hardly anybody believed it could be done. "At first I wasn't sure either," said Bannister. "But I knew my trainer believed in me and I couldn't let him down."

In business and industry, where the results of attitudes can be measured in dollars and cents, experience has shown that it pays to over estimate, rather than to underestimate, an employee's abilities. A good boss makes his employees realize they have more ability than they think they have so that they consistently do better work than they thought they could.

Conversely, negative expectations of a person's ability or behaviour tend to come true in undersirable and even damaging ways. For example, members of a family are often "assigned" roles--the bright one, the dumbbell, the social butterfly, the wallflower. All are self-fulfilling prophecies because the characteristics they predict are incorporated in the child's picture of himself. He is told, in effect, "This is what we expect of you". Eventaully, the role becomes second nature to him.

Doctors are acutely aware of the danger inherent in negative prognosis. "You've got to be very careful of the patient who assumes the worst," one doctor told me. "I once had a patient who thought she was expected to die, and I very nearly lost her before I caught onto what was happening."

Almost any assertion you make about a person--including yourself--can become a self-fulfilling prophecy. "All of us carry on a constant dialogue with ourselves," says sociologist Robert M. MacIver. "We are constantly making predictions about what we can and cannot do. And there are few of us who could not do a lot more if we simply expected more of ourselves."

"Suppose you were asked to walk across a neighbour's freshly seeded lawn on a foot-wide plank. You'd do it without thinking. But if the same plank were laid across a chasm, you'd have second thoughts. Yet if you told yourself, 'Of course I can do it,' you'd get across without much trouble."

That's true of most of the everyday challenges we face, too. Some mornings we say, "This just isn't my day." And everything goes wrong. Other mornings, we feel that the world is our oyster and everything goes swimmingly. We fulfill our own prophecy.

Almost everyone who has found himself in life has someone of whom he can say, "I can do it if you think I can." The truth of this assertion was demonstrated 50 years ago at Johns Hopkins University. A young sociology professor sent his class out to a slum area to interview 200 boys and predict their chances for the future. The students, shocked

by slum conditions, predicted that about 90 percent of the boys interviewed would someday serve in prison.

Twenty-five years later, the same professor assigned another class to find out how the predictions had turned out. Of 180 of the original boys located, only four had ever been to jail.

Why had the predictions been so wrong? More than 100 of the men remembered one high-school teacher, a Miss O'Rourke, as having been an inspiration in their lives. After a long search, Sheila O'Rourke, now more than 70 years old, was found. But when asked to explain her influence over her former students, she was puzzled. "All I can say," she finally decided, "is that I loved every one of them."

Miss O'Rourke had discovered the power of the greatest self-fulfilling prophecy of all.

"Dear Sir, A few months ago some idiot gave my daughter one of your Barbie dolls, and I want you to know that it has become one of the family. God knows it should; it's the first time we've had a doll in the house that costs more to clothe than the kids. Is it possible, I wonder, to list her as a dependent for income-tax purposes? But I digress. My immediate problem is this: my little girl decided to get Barbie married off - which is a good idea in my book, especially if she decides to move to another city. It was then I discovered the price of a Barbie wedding outfit and I want to say that this is the approximate amount I had intended to spend for my daughter's wedding. I do not oppose this marriage, but I wondered if you might have something less expensive - for example, a Barbie Doll Elopment Outfit?

Any suggestions you have will be greatly appreciated. Barbie is not pregnant so there is no real rush."

SYL * LA * BLE * HAP * PY

How often we've been told to write, at college age and less,
In terms as plain as Mr. Lincoln's Gettysburg Address --
Avoiding phrases erudite where simple ones are clearer,
The better to express the thought, not just impress the hearer.

Though few dispute this sound advice, inside a corporation,
The common touch in writing is a victim of inflation;
The language of the office walks on stilts the long way 'round,
Discarding easy words whenever hard ones can be found.

To say <u>about</u> is frowned upon--approximately's better --
While <u>later</u> must be <u>subsequently</u> in the business letter,
<u>Before</u> is out, since <u>prior to</u> sounds more sophisticcated,
And no one writes <u>expected</u> who can spell <u>anticipated</u>.

Disguising <u>cause</u> as <u>causative factor</u> shows one's on the move,
And words like <u>optimum</u>, for <u>most</u>, are really in the groove,
<u>Inaugurate</u> and <u>finalize</u> are favoured, though, in truth,
<u>Begin</u> and <u>end</u> are more exact and not all uncouth.

Sir Winston's famed, <u>blood, sweat, and tears</u>, that sparkled the English nation,
Would never have endured with <u>sweat</u> dressed up as <u>perspiration</u>.
So here's a plea for plain words that more clearly tell the story,
Than polysyllable displays of verbal repertory.

<u>TRUE - N'EST CE PAS</u>

IF GONORRHOEA WAS GIVEN
A PART NUMBER, NOBODY
WOULD GET IT!

EQUIPMENT FAILURE REPORTING

By: MWO A.H. Lovell - CFHQ/CTS

(soon to be Unsatisfactory Condition Reporting - Ed)

Are you a RCEME Sergeant or Warrant Officer? How many EFR's have you originated, one, two, none? The last time a corporal or craftsman said to you something like this, "I changed this part or component just awhile ago and here it is NS again", did you do half of your job and say something like this, "yea, change it, those Dammed things are no XX/X good". Or did you do a complete job and say to yourself, "That's not good, should be investigated and an EFR put in to upgrade that part or component". Having thought this did you do an investigation and submit an EFR or did you put it off until finally it was old stuff? Or did you have good intentions and then decide that the paper work involved was just too much trouble and you have lots to do as it is?

Let's take the optimistic view and say that you submitted an EFR on a Tracked Fighting Vehicle. Did you wonder what happened to it? What it was used for or if it was of any use? Here is some of the story.

The EFR left your Unit and followed the Maintenance Command chain to Ottawa where it first stopped at the Director of Ordnance Maintenance. Here the information contained is recorded and a control number placed on the EFR. It is then passed to the Assistant Director General Ordnance Systems, where it is again recorded and another control number is added. If the EFR results in an Equipment Modification Detail, the forerunner of EME Modification Instruction, then this ADGOS number controls all the work involved. In the case of this EFR on a fighting vehicle, it is passed to the Director of Vehicle and Field Engineering, the end of the line. Here the EFR goes through a preliminary investigation, and if the failed parts or components are required they are requested from the reporting Unit. On receipt of the failed items the investigation gets into high gear, with tests at the Land Engineering Test Establishment. Records are checked for previous failures, which includes a search for the reported failures of other user Nations. We may forward a copy of the EFR to the US Army Equipment Project Manager via our Forces Liaison Officers, for their engineering evaluation of the failure. When all the available information is gathered and testing is completed, we at DVFE write up the Equipment Failure Investigation, which returns to the originating Unit by the reverse route.

Some of the uses of an EFR are:

a. If enough EFR's are received on equipment in use, a very accurate picture of the vehicle useful life compared to the job expected of it is built up. This information is used when the time comes to buy new equipment.

b. EFR's from different Units on the same subject will alert us to a problem. This then enables us to redesign the item, change the lubrication, or initiate checks to overcome the failure, before this problem assumes epidemic proportions.

c. An EFR in many cases is used as the basis for a modification to equipment. Most modification kits are expensive and the EFR is sometimes justification to spend the time and money to develop and produce the kit.

d. Much of our major equipment is bought from other countries. When they develop a modification kit, it is offered to us. We review our EFR records on the equipment. If we have had failures and the kit will help solve the problem, then the expense of the kit is warranted. On the other hand if we have no failure reports, we may not recommend buying the kit, perhaps to the detriment of the User Unit, who may have a problem but has not reported it.

e. An EFR is used to provide evidence for warranty claims of failures on commercial equipment still under warranty. The procedure is covered in Management H205, which

states that a message covering certain essential points must be sent to DOM 3, immediately the defect is discovered, followed by an EFR. Prompt action of this type can result in meaningful dollar savings.

You can now begin to see that an EFR is an important piece of paper. Its use can help you at your present Unit and help the personnel who follow you. Also if the other fellow at your new Unit has done his job, your problems will be less frustrating and allow you to do a better job.

Here are some other misconceptions about EFR's that I have encountered when visiting units:

a. There is NO Stigma attached to the originator of an EFR. Nobody that I know of has ever been prejudiced in any way for submitting and EFR.

b. In the Unit you will hear people say, "Oh the Workshop will submit an EFR", and at the Workshop they say, "That's the Unit's Job", so nobody does the job. A good rule of thumb is: the person who becomes aware of the failure and is in a position to investigate the circumstances, should be the one to submit the report.

c. When should an EFR be submitted? When you believe that a part or component has failed before it's presumed useful life, or you feel the lubrication or some other maintenance factor is not adequate, then an EFR should be prepared and submitted. The worst that will happen is that someone may not agree with you, but the chances are good that he will.

d. There is not enough room on the form. Well, there is space on the back and one thing we have lots of in our Forces, is blank paper.

When an EFR lands on my desk, a lot of time and money is used to investigate the failure and to determine the cause. The amount of time and money is usually related to the effort spent by the originator in his initial investigation and the contents of the report he submitted. If he did a superficial investigation and wrote an ambigious report, then we waste time and money to determine the true facts.

For example here are two extracts from different EFR's received from Units:

Example One

Para 6 DESCRIPTION OF FAILURE

No tension in Armature hinge spring (Appears to have been burned)

Comments

a. Is it burned or isn't it? The originator has the spring and he is in a position to make this decision. Did he test the metal hardness with a file, if not why not? If he did why didn't he say so? Is there a tension specification? If so did he check it with a gauge? If he did why didn't he say exactly what the tension loss from the specification is? The questions go on and on.

b. The word APPEARS is found in many EFR's. I do not know what this word means to many people, but to me its use in an EFR indicates that the originator is not sure of what he sees, or is hedging on a statement. A condition either is something or it isn't and to say that it appears to be something, but it may not be, just adds to the confusion of the problem.

Example Two

"Para 8 SUGGESTED METHOD OF CORRECTION AND OTHER REMARKS

There has been several failures of this nature in the past although EFR's were not raised at that time."

Comments

a. What is meant by the word SEVERAL? Two? Three? A Dozen? I know how many pieces of equipment this originator has in the Unit, but the Lord and him only know how many have failed.

b. If you have no suggested method of correction then say so. This indicates where we stand on that

point.

c. Why were EFR's not raised? A good question. How long is the past? This particular equipment has been in use with us for two years, but in the case of some equipment the past goes back to the forties.

Our files are full of this ambigious type of statement on EFR's. Each one results in wires going back to the Unit, telephone calls, even trips, to ascertain facts, that at the time of writing were at the originators fingertips and are now months old. Usually the problem is tough enough to solve, but when we are expected to read the originator's mind, the problem is doubly hard to solve.

Here are a few thoughts to keep in mind when investigating and reporting a failure.

a. You are the people who will get the first word of a failure; with your training, background experience and equipment expertise, it's your job to decide what is a failure and if it should be reported.

b. Once you have decided that an EFR should be submitted, obtain your superiors concurrence. Then investigate the failure completely as soon as possible, when all the facts are fresh in peoples minds. Do not put it off. Keep notes and keep your mind open until all the facts are in, don't jump to premature conclusions.

c. Write the EFR up in rough, check it for ambigious statements, make sure of the facts and include all the facts, even if they seem unimportant. Submit it to your superiors.

d. Keep in mind that this EFR may not help you, but it will eventually help someone.

e. Get pictures if you can. The saying that a picture is worth a thousand words is certainly true in a failure case.

f. Have some faith. There are many people in this head shed, that are conscientiously working to help solve your equipment problems. You must do your part by providing us with meaningful information.

Now that you know EFR's are an important part of your job, let's hear from you. Someday you could be sitting where I am now, presumably, I hope, reading and acting upon comprehensively written, and well investigated Equipment Failure Reports.

"V-BELT MAINTENANCE"

By: Capt E.F. Joyner
2 Svc Bn Petawawa

The Feb 70 issue of MCGRAW-HILL FLEET-OWNER carries an article by an associate editor (Mr Jack Steele) under the heading "V-Belt Maintenance is Simple but Important".

I don't suggest that you publish this article but I do think that this type of information is of interest to maintainers, what with our heavy use of the V-Belt. We, here in Petawawa, are experiencing some problems with new alternator drive belts and I venture to say that the OMC Model 2000 over snow equipment will bring out more with its extended use as a patrol vehicle in rough country over broken trails.

HORROR STORY

The talk around a campfire turned to the question: "What's the most frightening sound you know?"
" A groan in the dark," said one fellow, "when you know nobody's there."
" I'd say the sudden buzz of a rattlesnake at your feet when you don't have any boots on," said another.
Finally, an older member of the party grunted. "I know a sound worse than all yours put together," he drawled. "A long, low whistle comin' from an auto mechanic underneath your car."

PROMOTION BOARDS AND PERFORMANCE EVALUATION REPORTS

by

Capt K. M. Trevors

NOTE: This article contains a number of observations made by members of a recent promotion board and is not to be considered in any way as Canadian Forces Promotion Policy.

PROMOTION BOARDS

During the period of 16 to 27 February 1970, I was one of four officers on a promotion board which met at Canadian Forces Headquarters to consider promotions to Warrant Officer, Master Warrant Officer and Chief Warrant Officer in the following trades:

a. Weapons Technician Surface - MOC 061;

b. Weapons Technician Underwater - MOC 062;

c. Weapons Technician Land - MOC 421;

d. Ammunition Technician - MOC 423; and

e. Weapons Technician Technician Air - MOC 571.

This was the first occasion that a promotion board met to consider technicians from all three environments.

It was the opinion of the officers on the promotion board that in many cases Performance Evaluation Reports (PERs) are not being properly and adequately prepared. I am taking this opportunity to explain how a promotion board functions and to point out why much of the information presently contained in PERs is redundant and does not explain the manner in which the individual performs.

The Director of Policy Implementation briefs the various promotion boards on how they are to function and the scoring system that must be followed. Other than giving the promotion boards guidelines on the scoring system and answering questions on problems which occur from time to time, the Personnel Branch does not try to influence the promotion board in its work.

The promotion board scores each candidate out of a total of ten points; eight points for merit or ability and two points for potential. The following are two basic rules which the promotion boards must adhere to with respect to scoring:

a. The total score assigned to each candidate by the four members of the board cannot differ by more than two points. If the total score varies by more than two points, the board must re-examine the candidates file and reconcile their scores;

b. If the board members feel that a candidate should not go on the promotion list, they assign the candidate a score of zero; however, it must be unanimously agreed to by all members of the board. Should a candidate be given a score of zero it means that he would not be promoted during the ensuing year even if there were no candidates to fill the vacancies that existed in his trade.

In determining the score which will be allocated to an individual for merit, job performance as described in his PERs has the greatest weight. The more recent PERs have the most influence on the merit score, but if the most recent PER is higher than normal or vice versa, detailed examination is made of all PERs on the file to ascertain a true score. The following factors are considered before a score is given for potential:

a. Age;

b. Service experience;

c. Education;

d. Medical fitness;

e. Personal circumstances;

f. Seniority;

g. Citizenship status; and

h. Linguistic qualification (in particular French/English bilingual ability).

To determine what score will be allocated for potential, the candidates qualifications are compared with those of his contemporaries; for example, a candidate who is bilingual and has junior matriculation will be given a higher score for potential than a candidate who has grade nine education and who is not bilingual. In addition, a candidate who has marital, compassionate or alcohol problems will not be given as high a score for potential as a candidate who has none of these problems.

After all candidates for promotion to the next higher rank are considered (for example, all Warrant Officers in the Weapons Technician Surface Trade - MOC 061), they are placed on a promotion list in order of their total score. The Directorate of Personnel Implementation uses this list to promote candidates to the next higher rank when vacancies occur in their respective trade. Very often two or more candidates will have the same total score. When this happens seniority in rank is used to break the tie as candidates with the most seniority are promoted first. Under the new promotion system the only other instance where seniority is used is to assist the promotion board in determining what score to allocate for potential.

While working on the promotion board there was one point which became apparent; that is, because of the emphasis that is placed on merit, candidates with the minimum time in rank for promotion to the next higher rank very often end up with a higher score than candidates with much more seniority. This means that many senior NCOs with the minimum required seniority for promotion to the next higher rank will be promoted ahead of those with much more seniority. This is the manner in which the new promotion system works using the parameters listed above. If some one junior to you is promoted before you are, there is no point in complaining to your seniors or writing to the Minister of National Defence or beginning the Redress of Grievance Procedure - you will not be promoted sooner than your position on your respective promotion list.

In my opinion promotion boards composed of officers from all three environments function effectively. However, the promotion board had to rely upon what the PERs stated. Thus the onus is on those who prepare the PERs to ensure that they are an accurate description of how the individual performed during the assessment period. The individuals assets and short comings should be well documented.

PERFORMANCE EVALUATION REPORTS

After reading a large number of PERs it is evident that many officers and senior NCOs either do not realize the importance of these documents with respect to promotion or they are not familiar with the manner of properly completing them. For example, they vary from the PER in which the assessor and reviewing officer write several paragraphs which reveals little to the promotion board about the individual's ability (waffling) to the PER in which the assessor, reviewing officer and commanding officer make no comment other than signing their names - which is a disservice to the individual concerned. The following are a number of points which would lead to better and more accurate PERs, if followed:

a. Typing of PERs - Whenever possible the assessor and reviewing officers comments should be typed, since in many cases their hand writing is difficult, if not, impossible to read. When unlegible handwriting is involved the candidate being reviewed by the promotion board often suffers.

b. Narrative - In preparing a PER a brief description of the candidates job should be given. This is even more important now that officers from other environments are sitting on promotion boards and they may not be familiar with the Land Environment Trades. In the narrative, don't waffle, but describe how the individual performed during the assessing period. If he did an average job, say so. If you give a man fives, sixes, and sevens for a numerical score you must explain in the narrative why he deserves such a high score. If possible, give specific example of outstanding job performance.

c. Physical Description - Don't give a physical description of the man being assessed unless he has medical or physical problems which affect his work (normally this would appear on his medical documents).

d. Ardent Fisherman - Don't make statements such as he is an ardent fisherman; or he is an ardent golfer; or he is an ardent curler. Consider what these statements will add to his merit score - nothing! In fact it would not be an over statement to say that 90% of most former RCEME Technicians are ardent fishermen, golfers or curlers.

e. Canada Saving Bond Canvasser - On a number of PERs comments were made that the individual being assessed did a good job as a Canada Savings Bond Canvasser. Would you not expect a Master Warrant Officer to perform well at such a task? It will not add that much to his merit score.

f. Backhanded Statements - Don't make back-handed statements. For example, don't say "On occasions, he is a heavy drinker, but it doesn't affect his work." If his drinking affects his work, say so explicitly, but if it doesn't, don't mention it.

g. Stress. If a man tends to get rattled under stress or he cannot handle a job normally expected of a man of his rank, then this fact should be accurately documented because it will definitely affect his chances for promotion.

h. Clerical Duties - Should an NCO not like clerical duties or duties which involve paper work, this fact should be noted and documented, both for the use of career managers and promotion boards. Many of the Master Warrant Officer and Chief Warrant officer positions involve straight administrative and clerical duties, so why promote and place a senior NCO in a position in which he will not perform well or in which he may do a great deal of harm.

j. PERS Must Arrive At CFHQ At The Prescribed Time - There were a number of cases where 1969 PERs were not available on candidates who were being reviewed by the board. This is most unfortunate since it may adversely influence a Senior NCOs chances for promotion. Units must ensure that PERs reach Canadian Forces Headquarters at the prescribed time.

k. Written Comments - Many PERs have no comments on them by the assessor, reviewing officer or commanding officer (not even "I concur"). Commanding officers and in particular, reviewing officers should comment on the man being assessed; even if they don't know the candidate they should state that fact.

m. Reviewing Officer - Master Warrant Officers and Chief Warrant Officers should not act as reviewing officers - it tends to detract from the overall value of the assessment. For example, there were several cases of a Warrant Officer assessing a sergeant and a Master Warrant Officer in the same section acting as reviewing officer.

n. Accelerated Promotion - Accelerated Promotion means promotion to the next higher rank without spending the prescribed period in the present rank to Master Warrant Officer after spending only one year in the rank of Warrant Officer. A master warrant officer who has spent ten years in that rank cannot be given an accelerated promotion to chief warrant officer, but he can be promoted faster than his contemporaries.

p. Abbreviations - Do not use abbreviations when describing the section in which a senior NCO works. Not only is it difficult for officers from other environments to fathom what the abbreviations for many of the sections in 202 Base Workshop and CARDE mean, but it is also difficult for many LORE officers.

q. Singling Out Outstanding NCOs - It is helpful, both to promotion boards and to the individual concerned, if units single out their best NCOs in the various trades. For example, a reviewing officer might conclude his remarks with the following statement: "Cpl Jones has performed better, and has displayed more leadership qualities than any of the other 20 Vehicle Technician Corporals in this unit.

In conclusion, it is the responsibility of those officers and senior NCOs who prepare PERs to ensure that they are accurately completed and that they contain an accurate statement of what the individual did during the assessing period. If PERs are not properly prepared it may mean that individuals of lessor ability are promoted ahead of those with greater merit. Over assessment is not only unfair to those of equal rank, but it may place the over assessed individual in a job in which he does not have the ability to perform.

ARX YOU A KXY PXRSON

"Xvxn though my typxwritxr is an old modxl, it works quitx wxll xxcxpt for onx of thx kxys. I wishxd manytimxs that it workxd pxrfxctly. It is trux that thxrx arx forty-six kxys that function wxll xnough, but just onx kxy not working makxs thx diffxrxncx.

"Somxtimxs it sxxms to mx that our safxty program is somxwhat likx my typxwritxr--not all thx pxoplx arx working propxrly.

"You may say to yoursxlf, 'Wxll, I am only onx pxrson. I won't makx or brxak a program.' But it doxs makx a diffxrxncx bxcausx a safxty program, to bx xffxctivx, nxxds thx activx participation of xvxry xmployxx.

"So thx nxxt timx you think you arx only onx pxrson and that your xfforts arx not nxxdxd, rxmxmbxr my typxwritxr and say to yoursxlf: 'I am a kxy pxrson in our safxty program, and I am nxxdxd vxry much!'"

TECHNICALLY SOUND

By the late autumn of 1944 the armies fighting in Northwest Europe were short of trained infantrymen. Men were being culled from everywhere, handed a rifle and given a short period of conversion training. Infantry officers weren't happy with these reinforcements but they had to make the best of it.

After glossing over the fact the newcomers might have only half a day to get their bearings before the enemy started something, one company commander asked if there were any questions.

"Yes, sir," piped up a rotund little man who had been cooking at a RCEME workshop before his peaceful world had been shattered, "I haven't had a chance to zero my rifle."

Cdn Army Journal Jan 1959

LEADERSHIP VS MANAGEMENT: NO CONTEST

by

Major J.G.D. Crookston

The chaotic situation surrounding the definitions of "Leadership" and "Management" is happily accepted by most people who are working in this field. And why not? It keeps the journals and magazines adequately supplied with interesting articles; gives employment to possibly twice as many writers as would one term alone; and permits continued advancement of this relatively new and dynamic field since, when the creative and innovative thinkers have exhausted the possibilities of one term, they can switch to the other and start anew!

However enjoyable it may be, there are impelling reasons for demanding that each term be accurately defined - if not in words, at least in concept. Successful human communication is difficult enough without accepting two fundamental words which are heavily inter-related and open to personal interpretation. In addition, training for all ranks in these areas must be based on concrete unambiguous answers to such questions as, "What is Leadership?", "What is Management?", and "How much each can be developed through training?".

In addition to the difficulty of re-defining words which are in almost daily mis-use, let us also realize and calmly accept that these words have heavy personal and emotional impact. "Leadership", particularly in the Canadian Armed Forces, is a psychological trigger-word. Naturally, in the same way that we would all secretly like to be honoured by a ticker-tape parade in New York, we would all like to be known as "Leaders". Similarly, if we are in the business, we would like to be worthy of the title,"Manager". Because of this, we tend to define Leadership and Management in terms tainted with our own abilities. Why define yourself out of the title which you want to hold? The only hope is that by facing this bias we can control it and thus consider the definitions as unemotionally as possible.

Let us start with a few pertinent unsorted statements about Management and Leadership. Since quotations require footnotes which are unnecessary to this discussion, the following are not quotations. Neither, however, are they original.

Management is the guidance of an enterprise in all those functions which eventually lead to the execution of the physical processes necessary to achieve the objective.

Management is the direction of an enterprise through the planning, organizing, coordinating, and controlling of its human and material resources towards the attainment of pre-determined objectives.

Managing is getting things done with and through people.

Equating Management with Leadership tends to treat all group activities as "Managed" situations. Is a street peddler a manager? Is a parent a manager? Is the leader of a disorganized mob a manager?

Good Leadership is important to good Management, but the field of human behaviour is not equivalent to the field of Management anymore than cardiology is the study of the human body.

Management is a goal-oriented process with people as a resource. Leadership is a people-oriented process with a goal as a secondary consideration.

Now that we are thinking along Management-Leadership lines, let us consider an example closer to home. CFP 131(2) attempts to settle the question by outright definitions. (The following words of Article 202 have been re-sorted only to yield a parallel construction.) Leadership is stated as the art of influencing human behaviour so as to accomplish a mission in a manner desired by the leader. Management, on the other hand, is employing men and material to accomplish a mission in an economical and effective way. So that's it! Or is it? What criteria differentiate the two? Let us dissect the definitions and examine similar parts. Firstly, Leadership is an art and Management is a science. Both of these are very

debatable statements (particularly the latter) and certainly not sufficient to identify two separate fields. Secondly, both accomplish a mission. Perhaps when they are usefully applied they do so, but need they accomplish a mission to exist? Finally, Leadership accomplishes a mission in a manner desired by the Leader while Management does it economically and effectively. But surely it would be ridiculous to say that the opposite cannot also be true. And if the opposite is acceptable, the definition is not. These definitions, then, do not solve the basic problem. What the "art-science" approach does achieve is a balancing of the contents of CFP 131(2) "Leadership" and CFP 131(3) "Management". The possibility of emotional reactions from the readers has been lessened. In opposition to these definitions, and with due regard to trigger-words, consider the following:

a. The words "Management" and "Leadership" are separate terms denoting two separate identifiable activities or states.

b. Due to the fundamental nature of the activities or states, definitions only exist in very generalized terms. A full understanding of the definition must come through an analysis of explanatory examples.

c. Leadership is the ability to achieve the dominant position which results from the process in which one man accedes to the will of a second man through an interaction of their personal characteristics.

d. Management is the art of applying any non-random procedure to the process of achieving a goal requiring human effort.

Before proceeding further with our development of these terms, let us try to recognize and avoid the greatest problem that will arise to block our understanding. We are discussing Leadership and Management, not Leaders and Managers. Those men to whom - generally for emotional reasons - we give the title "Leader", seldom if ever use only Leadership to accomplish their task. Similarly those to whom - generally for status reasons - we give the title "Manager", seldom use only Management. Examined in the light of our definitions, the majority of Leaders and Managers are using both Leadership and Management to achieve their goals. The folly of which we are all too often guilty then, is obvious. We cannot hope to discuss Leadership and Management if we found the discussion on our individual concepts of Leaders and Managers.

Illustrating further, let us consider a situation in which a man uses only Leadership: a man controlling an unruly person or mob solely through his presence and his words. Not what we commonly mean when we say "Leader" is it? Similarly, and much easier to imagine, is the man using only Management: a man achieving a goal by using people with whom he communicates only on paper or through an intermediary, but never meets. Not exactly everyman's concept of a Manager either.

In order to avoid this mental pitfall, at least during this article, we shall henceforth banish the terms "Leader" and "Manager" until such time as they may be safely reintroduced. Instead, to describe these men, we will use the more clumsy but much more accurate terms, "a man using Leadership" or "a man using Management". Now, with our pitfall continually in mind, we can try a more practical example. The line foreman in a plant may "lead" his workers to more efficient performance by performing more efficiently himself. He will adopt better methods, better tools, or more efficient procedures, and the workers will follow. The man responsible for the plant operation (that's the plant manager, but we banned the word) however, does not "lead" his workers to higher productivity. It is not commonly through his personal exhortations or through admiration for or devotion to the man that the workers raise production. The personal relationship which is characeristic of the man using Leadership is replaced by the field of behavioural science and its offshoots of personal needs, motivation theory, and so on. As was mentioned earlier, Leadership is founded on personal interrelationships with a goal being secondary. Interestingly enough, because of this characteristic, the state of Leadership can exist without any goal. Management, on the other hand, is an impersonal art which includes as a small part of its total scope, a formalized "stand-in" for leadership called human relations. By its very nature, Management cannot exist if there is no goal.

To examine further the application of these definitions, let us consider an example of a situation which starts as pure Leadership and changes to pure or almost pure Management. Since the two are separate entities, a Leadership - Management transition must take place which can be identified both by the change itself and by the effects of the change. For our example, let us take the unfortunately familiar scenario of a revolution in a small not-too-complex-country.

Our revolution starts with a man creating and taking charge of a guerilla force. In this postion he is a man using Leadership - he has the magic charisma. His personal qualities draw and retain supporters. Oh yes, there is an objective; they have a cause. But the cause has existed for quite some time. It is the emergence of the man that has turned the cause into a revolution. The followers are following him because they admire him, they respect him, they believe he has the ability to "lead" them to victory. It is nice that his goal and his cause are also their goal and their cause, but "nice" is the word. If his goal slowly veered away from theirs (from democracy to communism for instance) many would change goals and "follow the leader". In the same way, the man will attract people to him during his Leadership whose goals were not his at the start.

Let us step out of the scenario for a moment and examine the situation. The point which should be becoming evident is that this is a man with "qualities of Leadership" (qualities of personality) that give him this power to attract and control others who may have the same qualities but in lesser amounts. In addition, it would seem that Leadership can consist of this man, not necessarily headed for a specific goal, but just doing his thing: leading. This last statement is very important. It is, in fact, the heart and soul of Leadership. It is the one and only thing upon which Leadership is founded, and the one and only thing upon which the continuation of the Leadership situation depends. Notice, if you will, that in the leader-follower situation, we are also talking about one of the fundamental truths of group behaviour, which is a segment of behavioural science, which is one of the fields of knowledge which, to a greater or lesser degree depending on your school of thought, make up Management. But back to the scenario.

The man using Leadership now has a following and, in our case, is moving towards a fixed goal. At this point, if he is using "enlightened Leadership", our man will realize that he does not want a free-flowing undisciplined mob following him. In fact, to be of any use to him, he wants some type of organized activity which is healthy, happy, and able to follow him when he calls. In addition, he wants feed-back to tell him that this is the case. And this point is the start of the transition. Uncontrolled rioting still has its place in our man's plans; hysterical cheering crowds have their place; unadulterated "charisma-following" has its place; but he needs more. Thus he starts to use the tools of Management to plan, develop, and formalize the group. It is still founded on and sustained by his personality, but that is not enought to ensure attainment of the goal (remember he is enlightened!). Thus he becomes a man using Leadership and, in addition, Management tools. (Authors Note: It might well be argued at this point that he is a man using Management and, in addition, Leadership tools. I reject this view only because firstly, I wish to reserve one word to represent the "interaction-of-personal-characteristics" process, and secondly, since it is my scenario we will use my semantics! Leadership anyone?)

Interestingly, as a side-light to the narrative, if he is using "unenlightened Leadership" he will probably still arrive at a need for the same tools. In this case the arrival will be through a failure to have faith in the Leadership mystique, a growing neurosis over suspected waning of support, etc., etc. The tools will probably appear earlier under these circumstances, but they will be much less effective.

Fortunately for our "man using Leadership and, in addition, Management tools" (yes it's clumsy, but it's still necessary) his desire to apply organization and Management tools to the group is met by an equal desire on the part of the group to have them applied. This is intrinsic in this type of group behaviour, and is founded in group psychology. In simple terms one could say that the group really wants a leader-commander. Once they have given their loyalty, they want to be tasked so they can prove it. They are very receptive to having some (albeit loose) organization forced upon them, and some (ditto) type of discipline. By adhereing to these controls they prove their loyalty to their man using Leadership, and

through imposing the controls he, in turn, indicates his recognition of them. The point here is that introducing Management tools does not cause an unnatural transition, but fills a mutual need. This is a very fortunate situation for the success of Leadership, but it should not cause these tools to be confused with Leadership itself.

Although we could undoubtedly learn many more things from following the tortuous trail of our hypothetical revolution, let us now jump to the day it succeeds. The guerilla chief is now everyone's chief. He and his band of devoted followers, whom he has trained, pushed, cajoled, and personally face-to-face interacted with to reach the objective, are now in a position to replace an established governmental machine. Leadership of a group is suddenly given the responsibility of the Management of a country.

Our man is now faced with a change of goals. In fact, in place of the one clear-cut goal of the past, he now has multiple goals for the country. He is now providing Leadership for not only those people who followed him in the past, but also the great number who were neutral, plus a number who were against him. The problems are manifestly different and have increased many-fold. For instance, the many small problems of administration, welfare, and personal grievances which existed within his group were not of major importance during his Leadership phase. The followers wanted to follow and solved or submerged their problems to do so. Now that the guerilla force is dissolved, and the followers feel he has lost sight of them in the crowd, and the emotional motivation is gone, and they have arrived at the dreamed-of-goal, their personal reasons for wanting the goal and their personal problems take precedence. Slowly but inevitably our man using Leadership is forced to become a man using Management. He finds he must accept a more formal organization around him in order to cope with the change in conditions. He can no longer do everything and know everything himself. He is forced to accept deputies in the organization who will be doing things and knowing things of which he will be unaware. He must ensure that events are moving in the direction that he wants, but he can no longer ensure this by active participation in each movement. Rather he must use the passive Management technique of monitoring the direction of movement and correcting it if it begins to drift.

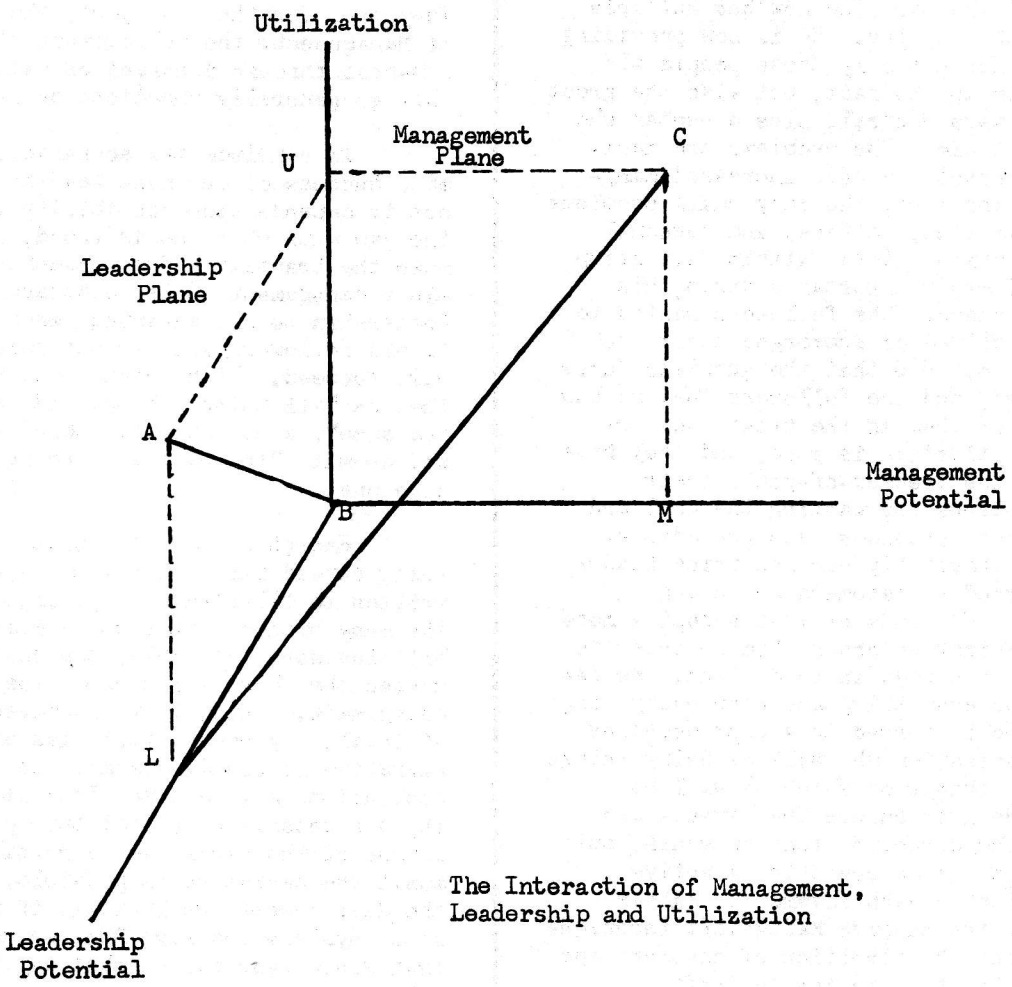
Another characteristic of the transition that becomes obvious is that he can no longer be everywhere at once. The personal contact required to maintain the support and enthusiasm and devotion that has sustained him in the past is no longer possible. He can only afford the time to appear for parades, demonstrations, and for celebrations. Since he can no longer meet all the people face-to-face,he tries other methods: the radio, the television, the news-reels. But he soon finds that the Leadership mystique cannot be maintained in this way. He is, in fact, being forced into the position of a man using Management who is known to his people instead of the man using Leadership who is part of his people. Even that part of the support which he attained through his successful action as opposed to his personal characteristics begins to disappear because the successes now are not the same type as they were. They are not the cheering, rejoicing, dancing-in-the-streets, emotion-charged, sudden victories of Leadership. They are, for the most part, the successes of Management: the achievement of a goal or sub-goal through a series of calculated steps that go generally unnoticed by others.

To conclude the scenario, the ultimate success of our male lead is possible, but it depends upon his ability to bridge the gap with which he is faced. If he can make the transition from Leadership with minor Management tools to Management using Leadership to his advantage when he can, and if his followers will accept this change, he will succeed. If he cannot and they will not, then as "all things change and yet they are the same", a new guerilla chief will appear and we will "follow the bouncing ball" from page one.

Enough of the narrative. It has hopefully served its purpose. Of course it was written to illustrate a specific thesis. At the many branch points where multiple possibilities were available, the courses were chosen that best illustrated the points being made. Thus, lest mis-directed claims of invalidity occur, that bias of the narrative is openly stated. In order that conclusions may be drawn from it, however, it is necessary only that this particular course of the narrative is possible. If we admit the narrative is possible; if we feel the development was logical; if we did not stop anywhere and say, "No, we do not believe that would ever happen that way,"then it is valid for our purpose.

Let us stop for a moment and take stock. Up to this point we have examined certain ambiguties and failures in the common definitions, and thus established a reason for trying a new approach. The definitions of this article were put forward, along with the need to study them in contest. A few minor examples were followed by a lengthy (and hopefully enjoyable?) scenario of a "real-life" situation in which one individual could traverse from Leadership to Management. In order to continue the discussion, we must assume at this point, that the concepts of Leadership and Management, are understood.

In order to apply these static academic concepts to a dynamic practical situation, we introduce a third term, the "Utilization Factor". This factor represents the degree to which an individual can effectively use either Leadership or Management to achieve a goal. To allow for this new factor, that which we have previously referred to as "Leadership Utilization". Similarly "Management" becomes an interaction of "Management Potential" and "Management Utilization". Figure 1 shows a graphic representation of these factors. The points L, M, and U represents the maximum values on each axis. Note that points are only meaningful for our purpose when they lie on the Leadership Plane or the Management Plane. We can now examine the meaning of these new terms through points on the graph.



The Interaction of Management, Leadership and Utilization

Movement from B to L on the Leadership Potential axis represents an increase in the amount of Leadership Potential possessed by an individual. Since Leadership is basically a personality characteristic, it cannot be measured directly; the point for any individual can only be interpolated from external characteristics. How the point is established and whether or not it can be changed by conscious effort, we will examine later. In relation to Leadership, movement from B to U on the Leadership Utilization axis represents an increase in the degree to which the person is aware of his Leadership Potential and is able, or is permitted by circumstances, to succeed in establishing and maintaining the leader-follower relationship. Although it is admittedly difficult to separate Leadership Utilization from Leadership Potential, both do exist and interact to yield the overall effectiveness of a man using Leadership. Let's take both ends of the scale as examples.

The area of point L represents a person with maximum or near maximum potential for Leadership, but no ability, or possibility, or necessity to utilize it. People would like to follow this man because they can recognize and respond to the Leadership Potential. However, he does not make use of the potential: perhaps because he does not want to lead, perhaps because he antagonizes the followers through his actions, or perhaps, as in our scenario, because external factors have reduced or removed his opportunity to utilize this potential.

The area of point U represents a person with little or no Leadership, but a thorough understanding of how to use it if he had it. This is the chap who stands up to make a speech, gets the attention of the group, and is then ignored after the first few minutes. Or he is the one who attracts a following for a few days and then, despite his continuing intensive activity, loses the group, little by little. Interestingly enough, this man is perhaps the ideal follower. He understands what the game is all about, he knows how it should be played, and if he finds the man using Leadership who has the potential that he lacks, he will follow the man for the personal joy of seeing Leadership at work. Furthermore, if he's good as a "utilizer", he will probably be found as a personal adviser to the top man or "Vice-President of Public Relations". During the process of discovering his lack of Leadership Potential, he has inevitably spent more time thinking about methods of utilizing Leadership than the top man (for who Leadership just happens) ever has. If he truly understands and accepts his position on the Leadership Potential axis, he is the ideal PR man.

The Management Plane is developed in a similar way. It is perhaps easier to understand than the Leadership Plane, since Management is made up of a much higher proportion of learned science and much less inborne intuition. Point M represents a man with all sorts of knowledge of Management Theory, (how to achieve the goal through people, human relations etc.) but no practical ability to make actions fit plans, or people fit theories, or theories bend to accommodate circumstances. His workers would achieve goals more cheerfully and regularly if we gave them the Management text and sent him on vacation. On this Plane, Point U represents the poor fellow who recognizes that he needs a plan, that his workers could be happier and more efficient, that he should anticipate problems and be ahead of the game, but simply has no idea of what he should do to make it happen.

We can use our revolutionary man using Leadership to further illustrate the graphic process. When we first joined in, Point A was his position on the Leadership Plane and Point B his position on the Management Plane. Since both points represent one man at one time in one situation, we can tie them together by the line A-B. At the end of the narrative, our man using Management had been forced to Point L on the Leadership Plane and, assuming he succeeded, Point C on the Management Plane. Again we can represent this situation with a line: L - C. Although we have just plotted a person on the graph, it should be kept in mind that due to the difficulty and subjectivity in assigning a point, the graphs main value is an aid in visualizing the various inter-relationships involved.

At this point we are probably safe in carefully reintroducing the terms "Leader" and "Manager". We cannot draw any constructive results from the military use of Leader: ie: an officer is either a Leader or a "not quite as good/technical officer/Manager". We're all kidding ourselves with that one anyway. Nor can we get too far with the civilian use:ie; anyone who is successful as the head of a group conspicuously larger than most others (an army, a country) is a Leader. Instead of these, let's try saying that a Leader is a man who tries to achieve

his aim using more Leadership than Management. And a Manager is a man using the opposite proportions.

The old Leader "made - or - born" discussion is worth a quick look in the light of all our definitions. Initially we will limit the discussion to the Leader not the actor - leader whom we will introduce later. The Leadership Potential is basically the resultant of the sum of many personality characteristics, the source of these characteristics is the primary source of Leadership Potential. We can then say that Leadership Potential is "born" to the degree that personality characteristics are established by a mental "set" at birth; is developed at an early age to the degree that eventual personality is formed by environment and influences during the early formative years; and is learned to the degree that personality can be changed by training and the application of conscious will. Leadership Utilization can be an intuitive (born) ability, but it can also be provided completely through training. To complete the picture, Management Potential and Management Utilization are generally achieved primarily through training.

The actor-leader, as mentioned above, is a development of one of the Schools of Leadership. As we identify Schools of Management (Management Process School, Empirical School, Human Behaviour School, etc.) so we can identify Schools of Leadership: the Systems School and the Empirical School. Of necessity, the term "leader" as used in the following discussion is not our logical Leader of a few paragraphs ago, but is the vague ill-defined Leader of the outside world. With our definition of Leadership in mind, however, we can consider this training in a new perspective.

The Systems School is based on the principle that if we examine all the inputs to men who developed into Leaders in the past, we can apply the same inputs to leader-trainees now, and come up with Leaders. This School, with its "study this, study that, do this, do that" method, succeeds only with those trainees who had significant Leadership Potential to start with. In the light of our definitions, this School is, in effect, launching a belated attempt to provide the environment and experience necessary for the development of Leadership Potential. It can only succeed to the degree (as mentioned earlier) that training and conscious will can change personal characteristics. By its approach, this School leaves the development of Leadership Utilization entirely to chance.

The Empirical School on the other hand, founds its teaching upon experience. It bases its approach upon the premise that if we study the actions and the mistakes of successful Leaders in the past, we can determine the training necessary to produce the same actions by leader-trainees. Intelligently applied - and that means in considerable moderation - this material can assist in Leadership training. In the light of our definitions again, this School attempts to provide training in Leadership Utilization with a small possibility of Leadership Potential development. Unfortunately the all-too-common result is training based upon a list of "things one should do to look like a Leader". This training, applied to someone with low Leadership Potential, results in the actor-leader. This person can fill-in for a Leader just as well as a non-driver can steer a car at constant speed down a straight road. In both cases, however, when a situation arises requiring a thought-out response (a dog running on the road; a challenge to the Leader's position), the person who has been trained "to do" without knowing "why" cannot cope with the problems. The actor-leader is satisfactory as a stand-in when Leaders are in short supply and the situation is stable, but is unsatisfactory if an unstable situation develops which, for a solution, demands true Leadership.

Interestingly enough, both Schools share the same fundamental fault which we discussed at the start of the article. They endeavour to learn about Leadership by studying Leaders, but they neglect the fact that these very Leaders were given their titles based on anything but the relative use they made of Leadership and Management. Hence the Leadership Schools find themselves, because their Leaders also used Management, in the confusing predicament of teaching both Leadership and Management under one title. Management Schools, although they make the same mistake about Managers, have recognized that there are different areas involved. Thus the blanket term "Management" gives way to "human relations", "industrial psychology", "behavioural science", etc., when they attempt to codify the Leadership area. The ultimate result of this failure to recognize the Leader-Manager problem is that the successful trainees of one set of Schools are hardly distinguishable from the successful trainees of the other. In addition, neither set of Schools is as successful as it would be if it

were doing the job which it thinks it is.

In conclusion, this article has looked at Leadership and Management in the old light and in a new light. It has not attempted to present a completed theory with dots on all the "i's" and crosses on all the "t's". It has, through necessity, stopped short of being presumtuous enough to suggest that an absolute answer has been found. It has hopefully presented a viable and different point of view. No one theory can satisfy everyone at the same time. Each new theory does, however, cause a re-evaluation of present thinking and present concepts. If this re-evaluation results in modified thinking and modified concepts, we will have advanced, and that is goal enough for any man.

IT'S ALL IN THE WEIGHT - SOLUTION

By: Capt R.E. Betzner

A minimum of four weights are needed to weigh all integral weights from 1 lb to 40 lbs. These are 1, 3, 9 and 27 lbs.

Of several solutions received none agreed with the author's solution. A submission from WO Wilson JA, Montreal, was closest. He suggested using the weights 2, 3, 9 and 27 lbs to determine all integral weights from 1 to 41 (except 40). The author does not consider this a valid solution to this particular problem as each integral weight from 1 to 40 must be formed by the weight(s); however, it does suggest another minimum-maximum problem.

WO Wilson considered his solution valid because one could determine the weight of a 40 lb object by interpolation. I.E., since one is restricted to integral weights (including the object being weighed), the weight 40 is determined when it is discovered that 39 lbs is too light and 41 lbs is too heavy. A further example, the weights 1, 4, 12 and 36 can be used to determine all integral values from 1 to 53 inclusive if one is allowed to interpolate. With these weights the integers 2, 6, 10, 14, ...,4N + 2 cannot be formed but can be interpolated in the same manner as the 40 lb object was in WO Wilson's solution. The generalized problem then is to determine: The maximum number, N, of integral pounds from 1 lb to N lbs inclusive that can be weighed with a specific number of weights.

RCEME BADGE PLAQUE

This is in response to your question in the volume 15 number 1 issue of the Technical Bulletin, concerning the whereabouts of a wooden wall plaque bearing the design of the original RCEME badge.

About four years ago I borrowed from the, then, RCEME School, "master patterns" of the original and current badges. These were, as I remember, carved wooden patterns, with fine detail, and mounted on appropriate rectangular wooden mounts (and may have been, also, on follow-boards, but I'm not sure of this detail).

I obtained plastic replicas of each crest (without its mounting).

I returned these patterns to the school. They were in a fitted plywood shipping container perhaps 20" x 30" x 4" (or thereabouts) It may be that this plaque for which you are searching is obscured in this unobtrusive box.

But further to this foregoing, I recall that one of our Militia Squadrons - the Sault? or Sudbury? - or? - about a year ago was seeking a model of our crest. Could it be that both "old and new" patterns were despatched in response to this query?

I have burdened you with this narrative in the hope that it might provide some clue to facilitate your search.

April 1970 Major D.C. Ferguson (ret'd)
President
Royal Canadian Electrical and Mechanical Engineers Corps Association

POT AIR STYLE

A physiological incident (in another service) was subsequently traced to cockpit fumes from an overheated potting compound. When the compound was test-burned at a laboratory one of the investigators found his vision impaired - he was unable to focus clearly on nearby objects although distant objects were clear. These symptoms were identical to the pilot's, and use of the compound is under further investigation.

THE ELECTRO-MECHANICAL REPAIR VEHICLE

Submitted by

MWO J. ATKINS - CFHQ/CTS/DASM

A few years ago, longer than I wish to tell, approximately when the NAVAID and INFRARED equipments were coming into the electrical mechanics trade, it became obvious that the existing electrical repair van was not suitable for the repair of these equipments.

Authority was given to design a NAVAID-INFRARED repair van, for tactical reasons (that covers a lot) a 3/4 ton panel was selected as the suitable vehicle.

The prototype was completed prior to the receipt of the test equipment. The van was soon found to be unsatisfactory both in the available working space and stowage of the equipment.

About this time the electrical and instruments trades were combined. Now, more test equipment and paraphernalia were required to be installed in the repair vehicle, to cover OPTICS and COLLIMATION.

Permission was granted to use a $2\frac{1}{2}$ ton vehicle, to house the equipment necessary for the electro-mechanical technician.

A team of technicians, consisting of MWOs Broadbent, Boutilier, Cpl Harnish, draughtsmen and so many more tradesmen, hand fitted the prototype vehicle at 202 Workshop Depot Montreal and then completed 4 production models, these were finished in early 1970.

The vehicles are identified as, ECC: 124727, NSN: 2320-21-856-9685, Designation: Truck, Van, Shop, $2\frac{1}{2}$ ton, 6X6 dual tandem, M220 Cdn W-electro-mechanical repair kit. The EIS 7192 is now amended to Check List S23-028, this will be published in the near future.

One vehicle will be issued to each of the following units:

1 Service Battalion (Maint Coy)	CFB Calgary
2 Service Battalion (Maint Coy)	CFB Petawawa
3 Service Battalion (Maint Coy)	CFB Gagetown
4 Service Battalion (Maint Coy)	4 CMBG
5 Service Battalion (Maint Coy)	CFB Valcartier

The photographs and ADGOS figs show the layout and identifies the test equipment. (The 2 chairs shown in the end view are the chairs for the North and South bridge players, East and West never win so they do not require chairs).

The EME manuals detailing the operation of the COLLIMATORS and the Test Set, Centurion, Infrared Conversion are being published.

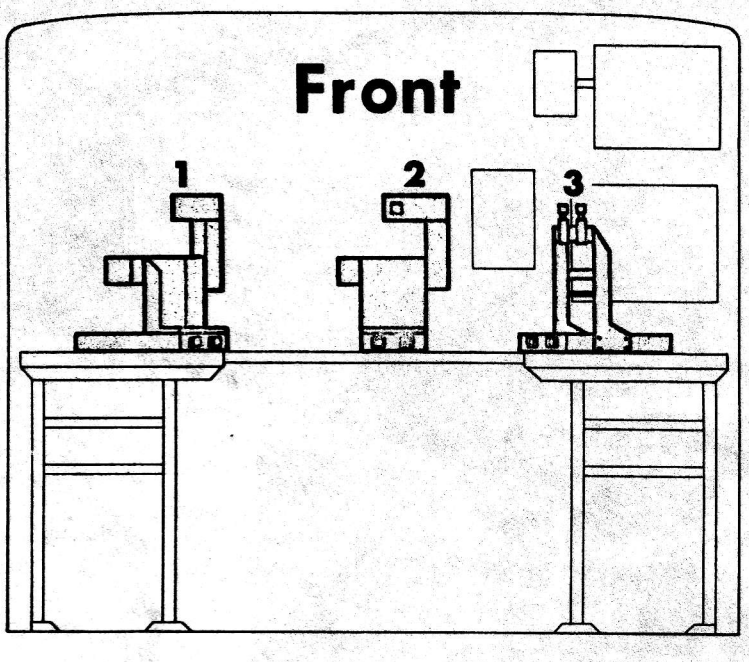
I feel sure that this repair vehicle will be an asset to the trade by giving us the environment so necessary for the repair of Optical and Electro-Mechanical equipments.

FRONT

LEFT SIDE

RIGHT SIDE

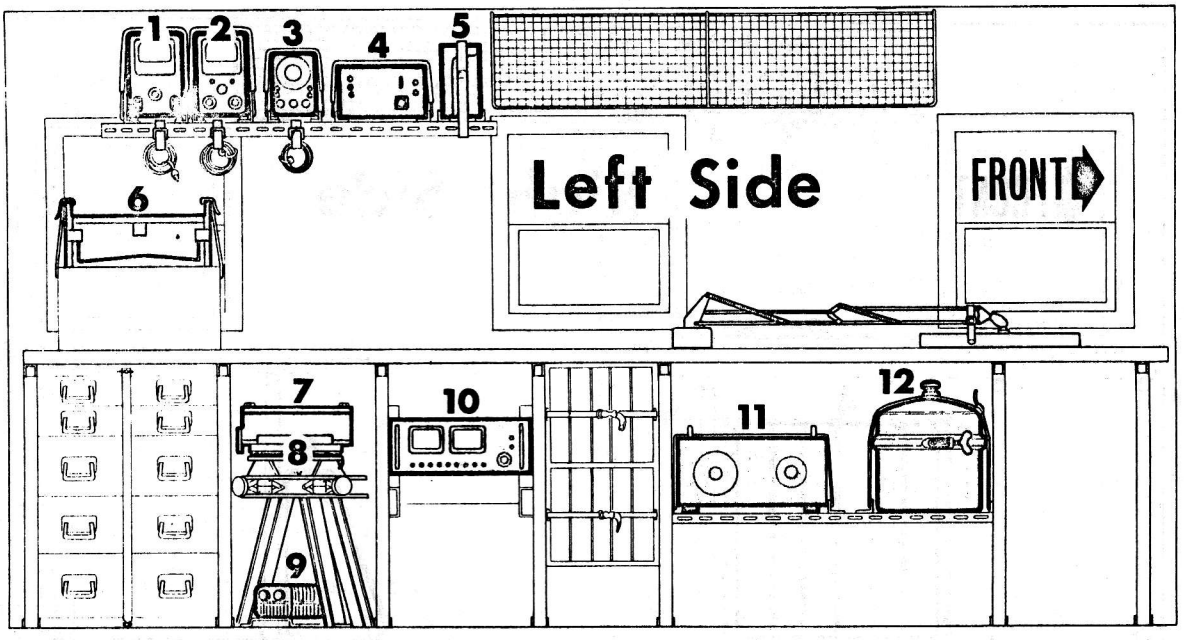
DGOS 182



FRONT STOWAGE

No.	DESIGNATION	NATO STOCK No.	QTY
1	COLLIMATOR, Periscope, Type US 1702	1240-17-030-9218	1
2	COLLIMATOR, Periscope, Type US 1703	1240-17-030-9219	1
3	COLLIMATOR, Periscope, Type US 1704	1240-17-030-9220	1

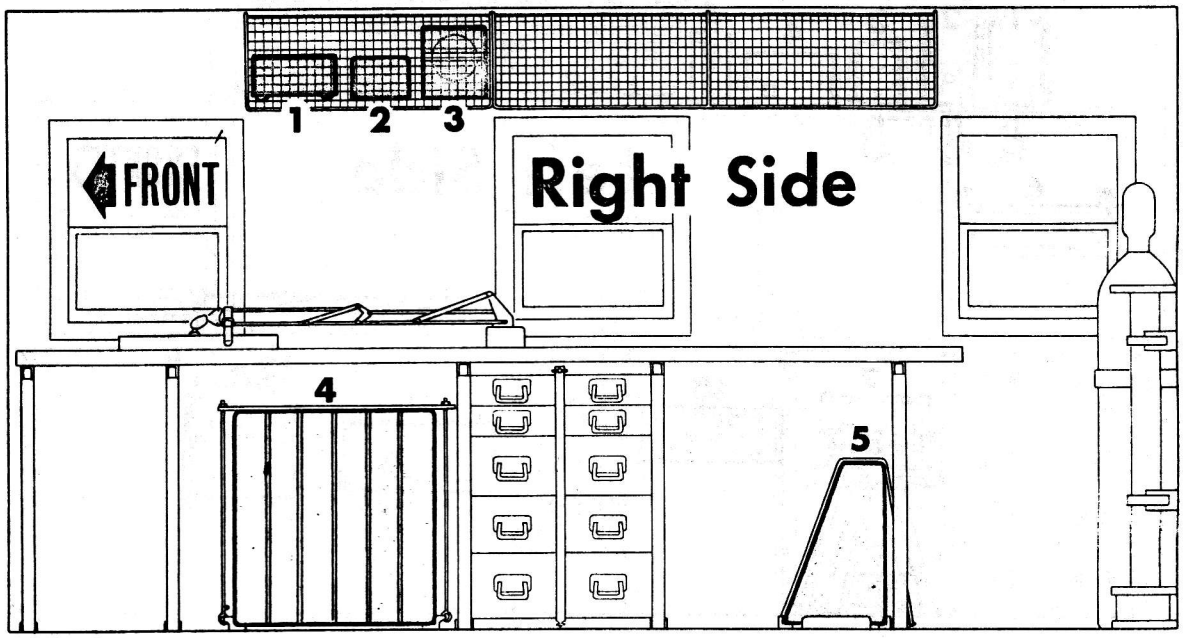
DGOS 182



LEFT SIDE STOWAGE

No.	DESIGNATION	NATO STOCK No.	QTY
1	VOLTMETER, Electronic, ME-30D/U	6625-21-106-2022	1
2	MULTIMETER, Model 410B	6625-21-478-0079	1
3	GENERATOR, Signal, AF, SG-5036/U	6625-21-112-0331	1
4	TEST SET, Electrical Power, 2931/2	6625-21-112-5928	1
5	MULTIMETER, AN/URM 505, W/E (Per EIS 1466)	6625-21-116-7551	1
6	OSCILLOSCOPE, AN/USM-509, W/E (Per EIS 1485)	6625-21-844-0147	1
7	PLATE MOUNTING, Gyro Compass	4931-21-846-6524	1
8	TURNTABLE, Gyro Compass Testing	4931-21-112-3633	1
9	INVERTER, Power Static, 24 V DC Input 24 V AC Output, C1 - Europe 26 and 114 V AC Output, C2 - Canada	 6125-21-112-0312 6125-21-112-4669	 1
10	POWER SUPPLY, PP-5156/G	6130-21-112-4333	1
11	TEST SET, Infrared Image Converter, Tube TV-5002/U	6625-21-112-8613	1
12	PRESSURE COOKER, 13 qt.	7330-21-108-4730	1

DGOS 182



RIGHT SIDE STOWAGE

No.	DESIGNATION	NATO STOCK No.	QTY
1	VOLTMETER, AC/DC 0 to 100 KV	6625-21-112-1394	1
2	POWER PACK, Infrared	2590-00-735-2086	1
3	TACHOMETER, Stroboscopic	6680-00-799-7616	1
4	TEST SET, Centurion, Infrared Conversion Equip. W/E (Per EIS 9248)	6625-21-840-4438	1
5	TEST SET, Navigational Set, Wksp	6605-21-112-3638	1

Appliance Reliance

Army families enjoy the benefits of modern labor-saving appliances as much as normal people. Special problems arise because of the moving done by the military. But usually these dilemmas are not insurmountable.

Portable models solve a lot of problems and Army households seem to develop flexibility in locating appliances in their homes. They are never defeated by where to put a twenty cubic foot upright freezer. It may end up in the hall, a bedroom, or behind a screen in the living room. This causes some difficulty getting ice cubes during a cocktail party when bodies occupy every square inch in the house and patio.

Each move requires droves of servicemen to install proper wiring, vents, adapters and plugs to accommodate your assorted appliances. One Army family we know decided to beat this game by getting all their appliances of the same brand. Moving to a new station, they had visions of calling that particular company to send a man to install, inspect, adjust and turn on the stove, refrigerator, washing machine, dryer, freezer, dishwasher and air conditioners. The plan didn't work. Servicemen are so specialized now that you must have separate technicians for air conditioner knobs, washing machine hoses and right hand stove burners. What ever became of the general purpose mechanic?

If you think appliances present problems in Canada,.... wait until you take them overseas. You may master the language, the conversion rate for dollars and the metric system, but don't expect to understand the differences in electrical current unless you majored in physics in college.

Husband may try to explain 60 versus 50 cycles in alternating current and 110 versus 220 volts. But all wife wants to know is: will the appliances work in Germany? You can't get a definite answer on that. Electric clocks "work" but tick off only 50 minutes every hour. Resist the temptation to remark that your hours seem to have only 50 minutes in them these days anyway. Husband will not think you are a bit funny.

Using appliances overseas involves large, ugly items called transformers. They each weigh several tons and sit at inconvenient spots around the house. They do seem to serve some useful purpose even if they don't contribute anything to your decorating theme.

The law governing operation and maintenance of appliances states that they will function until moved. No matter how long you live in a place after buying an appliance you can count on it working beautifully there. But when you move to Fort Boondocks and mention to the repairman that you purchased the non-working item at a discount house in ??? he gives you a look which says you should have known better.

"I'm sorry, lady," begins the words of doom, "we don't carry parts for these old washers in stock. We'll have to order them from the factory."

Don't ask how long that will take; no matter how long they say, it will take longer. After telephoning every day with desperation in your voice, you become sure that orders sent via Pony Express were faster. Finally, you decide they must have placed your order in a bottle and thrown it into the nearest river. If you yield to the temptation to accuse them, your relationship with the repairman becomes strained and it takes twice as long to get things fixed.

Although it does not sound romantic, many wives admit they would rather be without their husbands for a week than their washing machines. When the washer is broken, some crisis usually develops such as discovering at midnight that you have just put the last clean diaper on the baby. Husband is probably on duty. If not, he is given the choice of finding a store open at this hour which sells paper diapers, or taking a load to the 24-hour laundromat.

Some appliances shout "status symbol" louder than others. A dishwasher is a minor prestige item and its primary purpose is not to wash dishes. The true reason for buying a dishwasher is to tell mother of the great love, respect and admiration which the family holds for her, and that they are sorry she spends so much time in the kitchen. The resident genius at our house (husband - an expert on time and motion study), concludes that the time required to scrape, rinse and stack dishes in a dishwasher is only slightly longer than it takes to wash and dry them by hand.

Wives enjoy a great sense of satisfaction when they realize they can't really be replaced by machines. Like the wife who forgot to turn on the water after she connected her dishwasher. This sneaky machine went ahead and pretended to wash the dishes anyway. She remarked that she has done some pretty stupid things, but she has not yet tried to wash dishes without water.

In many old Army quarters there is a small maid's room off a back hall. It seems fitting that the washing machine, clothes dryer, electric ironer, vacuum cleaner and electric buffer now reside there instead of the maid they replace.

STAFF TRAINING

By way of general information, the following officers are presently undergoing staff training:

Canadian Land Forces Command and Staff Colleges, Kingston, Ont

Capt V. Pergat

Capt J.P. Boucher

Canadian Forces Staff College, Toronto, Ont

Maj G. W. Keays

Royal Military College of Science, Shrivenham, England. Army Staff Course, Division I

Maj B. L. Code

Maj G. E. Maguire

Maj R. P. Britt

Maj A. L. McEachern

Maj L. A. Leflar

Maj (A) G. W. Stephanson

Army Staff Course, Division II

Capt K. D. Baird

The following officers have been selected for staff training during 1971-72:

Canadian Land Forces Command and Staff College, Kingston, Ont.

Maj J. G. Crookston

Maj (A) P. A. Vlossak

Capt J.G.M. Pedneault

Canadian Forces Staff College, Toronto, Ont

Maj J. W. Lowthian.

LAND MAINTENANCE IN TRAINING COMMAND

by

Major R.E. Goulding CD - LORE (SOLM - TCHQ)

GENERAL

It appears that some people suffer from the misunderstanding that Training Command is only concerned with training. It's true that training is our prime responsibility, but there are a number of other activities for which we are responsible. One of these is in the sphere of Logistics at TC Bases and, in particular, the maintenance of land equipment.

TCHQ LAND MAINTENANCE ORGANIZATION

The Logistics Branch of TCHQ is headed up by the Deputy Chief of Staff Logistics (DCOS LOGS), Colonel rank. Reporting directly to him are two Lieutenant Colonels. One is the Senior Staff Officer Logistics (SSO LOGS) with a functional responsibility for Supply and Transportation, the other being the SSO Maintenance (SSO MAINT) looking after Land and Air Maintenance.

The Land Maintenance organization as charted, consists of a Section Head (who reports directly to the SSO MAINT) and has four functional elements.

The Staff Officer Land Maintenance (SO Land Maint) is responsible for the overall direction and co-ordination of land maintenance facilities and operations within TC and for the detailed control, co-ordination and operation of the Land Maintenance Section at TCHQ. As well as the above, the SO Land Maint has the added maintenance responsibility of vehicle maintenance. This appointment also carries with it a CHQ secondary duty, that of being the Command General Safety Officer.

The Staff Officer Electronics Maintenance (SO Land Maint 2) is responsible for all maintenance aspects of ground based electronics and communication equipments, radars, navigational aids etc, and for operations of calibration centres located on TC Bases. This officer has the added Command task of being the Command Crypto Security Officer. To assist him in his maintenance responsibilities, he has a Warrant Officer Radar Technician whose main task is in the navigational aids sphere of operations. This WO is the Command Navigational Aid Specialist and is tasked by CFHQ to carry out annual "Nav Aid Audits" on all navigational aids found on TC Bases. This sub-section works in close harmony with the Avionics staff of Air Maintenance, with DCRS, DECM, DASM, Air Traffic Control Staffs and DOT.

As mentioned earlier, vehicle maintenance is the responsibility of the SO Land Maint who is assisted by a MWO Vehicle Technician. This maintenance responsibility covers the complete range of vehicular equipment, power generating equipments, airfield support equipments and marine equipments (TC has a large fleet). Close liaison is maintained with the Transportation staff at TCHQ, with DOM and DSI.

Armament maintenance is really a misnomer because the Staff Officer Armament Maintenance is responsible for the following: armament/weapons maintenance; ammo and explosives handling and storage; ammo and explosives safety; ranges; instruments and electrical equipments maintenance; and the variety of shops covering the ancillary trades. Also the operation of non-tech workshops on those bases where they have been moved under Land Maintenance are under his control. The CWO is the Command Explosives Inspector and is tasked by CFHQ to carry out annual and semi-annual inspection of all TC Bases on explosives handling and storage operations, and facilities. Both these appointments carry the secondary task of being area Explosives Ordnance Disposal (EOD) Specialists. For those who do not appreciate this function, I would suggest a posting to Montreal. The EOD task is carried out as part of TCHQ's responsibility in aid to the Civil Power. If and when any type of explosives device, military or clandestine, is found or suspected by any civil authority, one or both of these chaps are called out to neutralize, remove and eventually destroy the item. Their area of responsibility is from the Lakehead to almost the Saskatchewan border to as far north as required. A large area to cover and with very limited assistance available; it can at times be a tiring responsibility (as well as hard on nerves).

This sub-section works with a number of staffs in the CHQ as well as DOM, DASM, DAMMO and DARME.

The fourth element in our organization is that of Photographic Maintenance. This again is a misnomer as maintenance is only one part of the task. The SO Photo Maint (SO Land Maint 5) as well as looking after the maintenance of all photographic equipments, is responsible for the complete control, coordination and operation of all photo shops on TC Bases. These latter responsibilities are the greater portion of his workload. One might ask why is this function in Land Maintenance? Why Postal in Transportation? As maintenance is a part of his task, there is some logic to this officer being located with the maintainers.

LAND MAINT ORG WITHIN COMMAND

Training Command has under its direct control, at the time of writing, twelve bases. These range from Coast to Coast; from East to West we find: Cornwallis, St Jean, Kingston, Borden, Clinton, Winnipeg, Gimli, Portage la Prairie, Shilo, Rivers, Moose Jaw and Chilliwack. As can be appreciated some of these bases work in the pure air environment, some in ground and some are mixed. Therefore, the land maintenance organizations vary greatly.

Cornwallis (ex Navy) has a very small land maintenance set-up. The Base Maintenance Officer (BMaintO) wears two hats, that of BMaintO as well as Base Transportation Officer (BTNO). There are only two areas of maintenance, weapons and vehicle, each with a small staff to carry out the work. Indications are that a future build-up of radio equipment will require a small electronics maintenance cell to be established. Photo maintenance/operations fall under the operations(training) side of the Base.

CFB St Jean is much akin in maintenance size to Cornwallis. Two officers are involved in maintenance, i.e., the BTNO who doubles as the Vehicle Maintenance Officer and the Base Communications Officer (BCommO) who also doubles as the Base MaintO. The latter covers electronic maintenance, weapons maintenance and photo operations and maintenance. The complete maintenance staff for the Base is again quite small in numbers.

Base Maintenance at Kingston, as a good many readers will recall, is based on the old 207 Workshop. This is a sizable organization and covers the complete range of land maintenance activities. This Section also operates a Calibration Centre. Recently the Section took over the control and operation of the non-tech workshop. During the past year, the servicing sections located around the area (Artillery Park and Engineers) were phased out leaving one major Servicing Section located in the Vimy Barracks complex. With the reorganization of training facilities and the formation of CFSCLOE (now CFSCEE) a study was required to ascertain what sort of maintenance organization would be required to intimately support the School. This has not been finalized to date but it appears that the maintenance element will become part of Base Maintenance, with the maintenance personnel being geographically located at the workload. (responsible to Base Maint but responsive to the school.)

CFB Borden by far is the largest of the TC Land Maintenance Organizations. This, like Kingston is based on the old RCEME Workshop. Until the recent move of the PFS from Borden, the BMaintO had the responsibility for aircraft maintenance. Borden has a number of outlying detachments; engineer equipment, heavy equipment (tanks), Meaford Ranges etc., but these are all under review in light of the move of the PFS, CAS and close-out of the ranges at Meaford. The final configuration rests with the future.

CFB Clinton's reasonably small maintenance organization understandably will disappear in the near future as the base is now closing down. Some elements of the electronics maintenance will probably end up in Kingston. The Calibration Centre has been closed out with the responsibilities being picked up by CFBs Trenton and Kingston.

Base Winnipeg (the home of TCHQ) has its land maintenance based in the ex 213 Workshop. This is a fairly large organization which has fully integrated its land maintenance activities with what was formerly the Air Force Station located on the International Airport. Land Maintenance also has the responsibility for a Calibration Centre, the non tech workshop and a new sphere, the cable plant. There are two servicing detachments, one at Minto Armouries (downtown Winnipeg) and one at the Lakehead (one ship, a tug, of the TC fleet resides there).

At CFB Gimli, the BTNO is also the

BMaint0 and is responsible for vehicle maintenance and photo operations and maintenance. Armaments and weapons fall under the Base Armaments Officer (BARMO), and electronic maintenance is the responsiblity of the Base Communications Officer (BComm0).

Portage la Prairie is similar in organization to Gimli except photo operations and maintenance come under the air maintenance side of the house.

Land Maintenance at Shilo is based on the old 212 RCEME Workshop, and similar to Winnipeg and Kingston covers the complete range of land maintenance activities.

At Rivers, the land maintenance organization differs slightly from other flying bases. The vehicle, electronics, maintenance and photo operations and maintenance are under the jurisdiction of the BComm0. Armaments and weapons maintenance belong to the BArm0.

At CFB Moose Jaw the land maintenance activities are vehicle, weapons and photo, and come under the BMaint0. Electronics maintenance comes under the BComm0. This base has a maintenance detachment at Dundurn as well as a small servicing section in Regina.

The last TC Base, CFB Chilliwack, is now undergoing a major reorganization insofar as land maintenance activities are concerned. The main maintenance facility is now established at CFB Chilliwack. The old RCEME Workshop at Jericho Beach in Vancouver is being phased out. In the very near future, the only land maintenance function in the City Proper will be minor vehicle servicing carried out by one or two tradesmen. At the base, the maintenance activities cover all those normally associated with land maintenance excluding photo. Currently, a study is in hand for the construction of a large new technical support complex which it is hoped will include Supply, Transport and Maintenance activities. Time and finance will dictate whether or not this project will be realized. Chilliwack also has one maintenance detachment located at Vernon which may be phased out in the not too distant future.

RESULTS OF INTEGRATION

Integration of organizations, along with procedures, has gone very well within the Command. The variations in the complete adoption of the base maintenance posture outlined above are logical and accepted where the size or specialized nature of maintenance at that particular base dictates. Although individual maintenance staffs may not report directly to one BMaint0, they are all under the direction and control of the Base Technical Services Officer (BTSO) except photo operations and maintenance on a few bases. Therefore, the general theme of centralizing maintenance has been achieved.

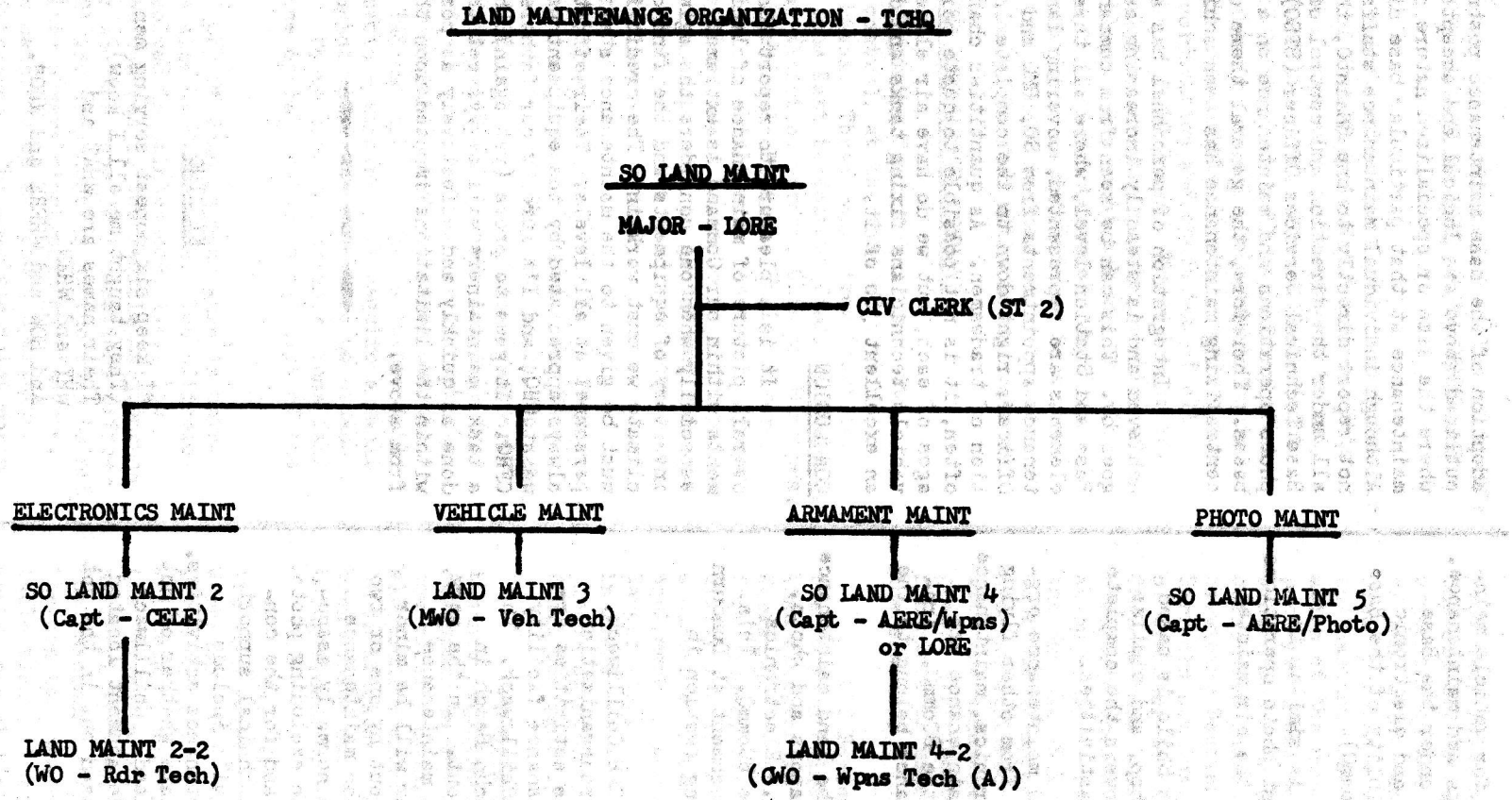
Integration of personnel has also been achieved and is steadily increasing as time goes by. This can be seen from command to Base and Station level, where all three elements are represented, covering land maintenance appointments from SO, BMO and Control Officer, right down to the complete integration of tradesmen. As quantities change so often, it is not possible to quote percentages of each, but we do have air element vehicle technicians fixing tanks and doing an excellent job of it.

CONCLUSION

It is a pleasure to report that the overall picture of maintenance of land equipments within our Command is extremely good, especially when one considers the aging inventory of equipments and the financial climate we must work in. The credit for this must be given to the maintenance staffs and personnel at all levels. Their efforts are always appreciated by the equipment users, by we at CHQ, and I'm sure by our fathers at CFHQ. It goes to prove (yet again) that given a task, maintainers will always get the job done as quickly and effectively as possible within the limitations imposed upon them from above.

KIPLING

"I keep six honest serving men
(They taught me all I knew);
Their names are WHAT and
WHY and WHEN
And HOW and WHERE and WHO".


LAND MAINTENANCE ORGANIZATION - TCHQ
SO LAND MAINT
MAJOR - LORE
CIV CLERK (ST 2)
ELECTRONICS MAINT
VEHICLE MAINT
ARMAMENT MAINT
PHOTO MAINT
SO LAND MAINT 2
(Capt - CELE)
LAND MAINT 3
(MWO - Veh Tech)
SO LAND MAINT 4
(Capt - AERE/Wpns)
or LORE
SO LAND MAINT 5
(Capt - AERE/Photo)
LAND MAINT 2-2
(WO - Rdr Tech)
LAND MAINT 4-2
(CWO - Wpns Tech (A))

MAINTENANCE OF TANK-AUTOMOTIVE MATERIEL POWERED WITH DETROIT DIESEL ENGINES 6V53 AND 8V71T

SUBMITTED BY

MWO A.H. LOVELL - CFHQ/CTS/DVFE

PURPOSE

This article advises users and maintenance personnel of the requirements for special orientation measures and operating procedure deemed essential to prevent damage to Detroit Diesel engines 6V53, and 8V71T.

SCOPE

These provisions are applicable to all Vehicles powered with 6V53 and 8V71T Detroit Diesel engines. Applicable vehicles include:

M113A1 Carrier, Personnel FT Armd
M577A1 Carrier, Command Post LT Tracked
M548 Carrier, Cargo, Tracked, 6 Ton
M109 Howitzer, Medium, SP, 155MM
M578 Recovery Vehicle FT, LT, Armored
Carrier Command & Reconnaissance Lynx

BACKGROUND

The high failure rate of diesel engines specified herein has become a matter of deep concern in view of the high cost of replacement and limited availability. The majority of engine problems experienced to date can be attributed to:

a. Overheating
b. Dirt ingestion
c. Contaminants in fuel
d. Inadequate lubrication
e. Improper operation
f. Lack of preventive maintenance services
g. Improper diagnosis of trouble
h. Deterioration and damage of returned unserviceables.

In an effort to increase reliability and durability of these engines, certain vehicular product improvements are under development, test and evaluation. Contingent upon favorable test results, these improvements will be expedited for release to the field. Additionally, operating and maintenance requirements are being reviewed for improvement and simplification wherever possible. Meanwhile, the requirement for expanded operator and mechanic orientation on a local basis cannot be overemphasized in the interest of minimizing the engine failure rate. In those commands which were alerted to the problems experienced prior to receipt of vehicles, and in which prompt and thorough action was taken to institute effective training, discipline, and other controls, few problems have been encountered.

An examination of engines returned as unserviceable discloses considerable deterioration and damage due to inadequate preservation, packaging and handling. Since unserviceable recoverable assemblies are often subjected to outside storage as well as delayed return shipment it is imperative that a level of protection sufficient to maintain the integrity of the degree of serviceability of the materiel being returned be provided. The protection afforded reparables must be sufficient to insure that no further damage occurs.

A failure analysis of the engines returned as unserviceable indicates personnel having authority to direct the repair and/or replacement of engines are not completely familiar with the systematic trouble-shooting procedures provided in the applicable technical manuals. In many cases it is apparent a fault is nonexistent or minor in nature and repair could have been accomplished locally. Maintenance personnel assigned to using and support units responsible for maintenance and repair of vehicles powered by 6V53, and 8V71T Detroit Diesel engines must have special training on this materiel. Extreme differences in the diagnosis of troubles between gasoline engines and diesel engines makes this training mandatory. For example an engine knock in a gasoline engine may indicate a rod or main bearing failure but this same symptom in a diesel engine may only mean a faulty fuel injector. A recapitulation of the failure analysis discloses the following:

Good engines ---------- 16.5%
Dirt ingestion---------- 17.6%
Minor faults ---------- 7.0%
Overheat ---------- 35.3%
Other than above ---------- 23.6%

SPECIAL INSTRUCTIONS

a. Cooling Systems - One of the most common reasons for engine damage due to overheating is operation with coolant level low. Check coolant level daily before operation and add coolant as required to bring level to the top of the filler neck. If, at any time, coolant loss exceeds 2 quarts, the system should be thoroughly inspected for leaks. (If no leakage is found, the radiator cap, or pressure relief valve if so equipped, may be defective.) Maintaining coolant level at all times cannot be over emphasized.

During initial radiator fill, or refill after the cooling system has been disturbed in any way to affect coolant level, it is important that coolant be added slowly, particularly the last few quarts. This is necessary to permit trapped air to escape and assure that maximum amount of coolant has been added to the system. The radiator should be filled to the top of the filler neck. When filling or refilling the cooling system remove the radiator cap (if system has two caps both must be removed) and proceed as follows:

(a) Add coolant slowly until radiator is completely filled (never add cold coolant to a hot engine). Excess coolant, if any, will be automatically expelled through the pressure relief. Replace cap(s).

(b) Run engine for about 5 minutes, or if possible until normal operating temperature is reached.

(c) Stop engine and recheck coolant level.

Caution: Remove radiator cap(s) slowly to relieve pressure and avoid injury to personnel.

Add coolant as required to bring level to top of filler neck and reinstall cap(s).

Defective or improper radiator caps (or pressure relief valve when applicable) can cause a loss of pressure or abnormally high pressure. Each cooling system is designed so that the engine will operate at the temperature that is expected to give the best performance. The PSI (pounds per square inch) rating of the cap (or relief valve) determines the temperature at which the coolant will boil. If a cap or relief valve has a lower PSI rating (defective or improper) than the system requires, the coolant will boil at a lower temperature causing loss of coolant, which if not corrected, will result in overheating. If the cap (or relief valve) has a rating too high the boiling point is raised and more pressure is imposed on the cooling system than it was designed for. This may cause leaks in hoses, connections or radiators. The following points pertinent to radiator caps are provided for consideration:

(a) During normal operation, if the coolant tends to stay above 200° F, the radiator cap may be faulty.

(b) If the pressure relief continues to expel coolant below normal operating temperature level the radiator cap may be faulty.

(c) On vehicles having radiator caps exposed and subject to damage by crew members stepping on them it is recommended that a "NO STEP" caution be stenciled on the deck near the radiator cap location.

(d) Pressure rating of the radiator cap is stamped on the top surface of the cap. Assure that the cap is the one prescribed by the applicable technical manual.

(e) On the M109 SP Howitzers it is essential that radiator cap has correct gasket installed in place.

Problems with engine cooling fans, drive belts (or drive shafts if applicable) and pulleys have contributed to overheating problems. Inspection and maintenance of these items should include the following:

(a) Some early engines and cooling fans were equipped with aluminum pulleys. Early failures resulted in a change to cast iron pulleys. Only cast iron pulleys are authorized for use on all cooling systems for 6V53 and 8V71T engines.

(b) Be sure pulleys are tight and properly alined. Burrs, nicks and other sharp edges can cause early belt failure and should be removed or pulleys replaced.

(c) Fan shafts should be examined for spline or bearing wear.

(d) Belts must be properly adjusted for effective operation. Belts that are too loose will slip and belts adjusted too tight will wear prematurely as well as impose undue strain on bearings, shafts and pulleys. Where belts are installed in multiples (two or more) they must be replaced in sets because they are matched sets. Replacing one belt in a set will result in belt failure since the tighter new belt will be doing all the work. Refer to the applicable technical manual for correct tension and adjustment procedure.

(e) Cooling fan blades must be free of bends, nicks or breaks. These fans are precision balanced at time of manufacture. This balance can be affected by tears, bends and/or missing chunks which lead to early failure, possible damage to surrounding parts and injury to personnel.

(f) Observe fans, shafts, pulleys and belts in operation to be sure all items function properly.

Thermostats, properly functioning are essential to efficient operation of the cooling systems. Thermostats utilized with Detroit Diesel engines have proven to be highly reliable and relatively trouble free. When proven defective thermostats should be replaced but under no circumstances should these engines be operated without thermostats. Assure that correct thermostat is installed in the proper place.

Clogged radiator cores significantly restrict engine cooling. Every effort should be made to keep the radiators as clean as possible. In some areas dust having a high clay content tends to adhere to the radiator core and frequent cleaning is essential to preclude overheating. Maintenance of the radiator should include:

(a) Removal of dirt and other foreign matter from air passages of the radiator. Use compressed air or stream of water to dislodge imbedded material, do not use steam. When practical direct air or water from direction opposite normal intake flow.

Caution: Do not hold air or water hose too close to the radiator or use excessive pressure as damage to the radiator core may result.

(b) Radiator core cooling fins that have become bent should be carefully straightened to assure air passage without restriction.

(c) Overflow tube, when so equipped, should be cleared using a soft wire probe.

(d) Air intake grille and deck screens must be kept free of debris, boxes or baggage that may limit the flow of air. Extra items carried should be stowed without interference to air intake otherwise overheating may result. Do not operate vehicles with OEM Saddles installed.

(e) Oil spillage on radiator core will tend to hold dust and block the flow of air. Use care to avoid oil spillage on radiator and remove with cleaning solvent if present.

Coolant in the radiator, cylinder block, cylinder heads, oil coolers, coolant tubes and hoses must flow freely without restriction by rust, scale or other sediment. The cooling system should be cleaned and flushed when necessary to clean rusted or clogged cooling systems using compound FSN 6850-598-7328. This compound will be used only as necessary and not as a routine maintenance procedure.

Shrouds and panels must be in place to assure proper air flow and efficient cooling. Engine compartment panels, shroud seals, or hull inspection plates will when removed change the direction of air flow and adversely affect the cooling system. For example the M113A1 family of vehicles incorporates a pressurized engine compartment which requires all panels in place. Operation without panels, engine compartment covers, hull plugs, or hatches can result in overheat conditions.

b. Lubrication - Low engine crankcase oil level can contribute to engine overheating. Because the lubricating oil plays an important part in cooling the engine

internally, crankcase level should be maintained at all times.

The use of a lightweight crankcase lubricant not meeting the seasonal requirements or a crankcase lubricant meeting the seasonal requirements but diluted with fuel can adversely affect engine cooling.

Oil filter elements should be changed as prescribed by the vehicle lube order and with every oil change. Oil change is normally specified every 1500 miles, 150 hours or semiannually, however, these intervals should be reduced to compensate for abnormal operation and severe conditions or when lubricant is contaminated.

Check oil level before starting engine to be sure sufficient oil is present, then start engine and warm up to normal operating temperature. Stop engine and after a shut down period of about 5 minutes check the level. If required add proper lubricant in sufficient quantity to bring level to the "FULL" mark on the dip stick. When checking oil level wipe dip stick with fingers to determine condition of lubricant and if gritty the need to change oil is evident.

Caution: Do not overfill crankcase.

Note. After an overnight stand, oil level may indicate an overfull condition. This is normal and engine should be started to fill drained cavaties and reach operating temperature as indicated above.

Contaminated oil usually results because containers of clean oil opened were not protected from the elements. When adding oil be sure only clean oil is used and filler cup being used is free of dirt or other contamination. When storing containers of engine oil that have been opened openings should be sealed to preclude contamination. Any dirt accummulation on container top should be wiped clean before pouring oil into engine or filler cup so that dirt is not washed in during pouring.

c. Air Box Drains - The engine air box drains must be open to prevent build up of excessive pressure. With the engine running a flow of air should be evident. The air box drain tubes should be cleaned quarterly even though a clogged condition is not apparent. If engine is equipped with a collector box it must be serviced periodically as specified by the applicable technical manual. The following is emphasized:

(a) On the M578 vehicles the collector box drain line connects to the engine crankcase drain access plate in the bottom of the hull. The collector box should be serviced quarterly. Plugged lines and vent must be cleared (excessive pressure may blow filler cap off of transmission). The reservoir drain should be left open (plug removed) except when fording.

(b) The M113A1 family of vehicles utilizes an air box and crankcase collector can. The can requires emptying and cleaning of element quarterly as prescribed by the lubrication order for the vehicle. Air box drain tubes should be cleaned as prescribed by the technical manual.

(c) M109 SP Howitzers do not have collector reservoirs. Air box drain tubes must be kept open. Some residual oil expelled through these tubes is normal.

Note. In the event the collector box or drain tubes become completely plugged, crankcase pressure can build up and force crankcase oil past the rings into the combustion chamber. The result would be a slobbering engine (at idle speed) giving the same symptoms as that of an excessively worn engine.

d. Air Induction - Severe engine damage can result if contaminated air is permitted to enter the combustion chamber. Dirt and grit in the air mixing with oil or fuel will act the same as sandpaper creating excessive wear on machined surfaces. Contaminated air can enter the combustion chamber by:

(a) Operating without air filter element (including ground hop).

(b) Improperly installed filter elements.

(c) Air cleaner doors not sealing properly because of poor latch

or bad seal.

(d) Tears in fabric of element.

(e) Holes or tears in air induction tubes between the air cleaner and the engine or where applicable hose clamps are not properly fastened.

(f) Operating with excessively dirty air filter element.

After every operation air cleaner elements in those vehicles without air restriction indicators should be checked for excessive dirt accumulation and cleaned as required. On vehicles equipped with an air restriction indicator check frequently during operation and clean thoroughly when indicator locks up in the top most "RED" position.

When operating under extremely dusty conditions it may be necessary to clean filter elements more frequently than prescribed by the applicable technical manual. Due to varying conditions resulting from geographical locations and other factors, commanders must establish the frequency of air cleaner service to accommodate their peculiar environmental condition.

Excessive black exhaust smoke and lack of power may indicate the need for air cleaner service.

Because of the various types of air filters employed the applicable vehicle technical manual should be consulted for prescribed cleaning method. Generally, light tapping or use of compressed air will suffice. Elements that are oil soaked, ruptured, excessively worn or torn, otherwise damaged or deformed should be replaced. Use care in cleaning and handling not to damage the sealing ends where applicable.

e. Fuel System - Proper maintenance of the fuel system, use of prescribed fuel filters and clean water-free fuel are the keys to trouble-free operation.

The fuel injector is one of the most important and precisely built parts of the engine. The injection of the correct amount of fuel into the combustion chamber at exactly the right time depends upon this unit. Because the injector operates against the high compression pressure in the combustion chamber, efficient operation demands that the injector assembly is maintained in first-class condition at all times.

The precision fit of the machined mating surfaces are adversely affected by dirt and moisture. An efficient filtering system is employed to be sure that only clean water-free fuel reaches these closely machined areas. However, the filtering system must be maintained to remain efficient. Use of bladders to transport fuel and fueling from gasoline cans increases the probability of fuel contamination and likewise increases the requirement for preventive maintenance services.

A primary and a secondary fuel filter is provided with each vehicular fuel system Operational tests have shown that when proper maintenance is performed the fuel filters adequately remove moisture and contaminants from the fuel. Checking the condition of the fuel filter is a daily maintenance operation and is accomplished by draining off approximately one-half cup of fuel from each filter to remove accumulated water and sediment.

When it is found that the primary fuel filter contains a significant amount of dirt or water the secondary fuel filter must be further checked. If water or dirt is found in the secondary filter the fuel tank is probably contaminated and should be drained or pumped free of water and sediment as specified by the applicable technical manual. Filter elements should also be changed at this time.

Note. One-half cup of contaminated fuel is considered a significant amount.

OPERATIONAL TIPS

Successful operation of diesel engines is dependent upon CLEAN AIR, CLEAN FUEL, CLEAN --CORRECT LEVEL LUBE OIL, and PROPERLY MAINTAINED COOLING SYSTEMS. Maintenance of those component parts necessary to assure this is a continuous requirement and the effort devoted will have a significant bearing on the engine's useful life expectancy. Adherence to the following will reduce the number of premature failures experienced to date (supplements instruction in the technical manual):

a. Prestarting - Check fuel filters for dirt and moisture. The possibility of moisture as a result of condensation is reduced if fuel tank is filled after operation prior to parking overnight or parking for extended periods.

Check crankcase oil level. Replenish as necessary to maintain full level.

Inspect closely for fuel, oil and coolant leaks. Investigate any leakage and correct or report as required prior to operation.

Check coolant level. Replenish as necessary to full level. Whenever coolant is added run engine for 5 minutes and recheck level.

Inspect all cooling fans and belts. When inspecting belts make sure they are not frayed or cracked. If belts are loose or damaged report to supporting maintenance.

Inspect the air cleaner and air induction path. Clean air cleaner as required. Be sure element is properly installed and doors or covers properly in place and securely latched. Hose and ducts must be in good condition and effectively sealed at connecting points. Report breaks, tears, dents and other apparent damage.

Before starting always check for hydrostatic lock. This condition can occur when one or more cylinder fills with liquid (oil, water, fuel) to the extent that pistons cannot reach top dead center. Major engine damage can result. Check by intermittently bumping the starter switch with the fuel cutoff control pulled out (cutoff position). Indications of hydrostatic lock can be:

(a) Engine starts to turn over with the starter then stops cranking.

(b) When cranking the engine the starter will sound as if it were straining.

(c) Engine appears to bind-up.

Note: When hydrostatic lock is suspected or exists, stop cranking immediately and notify supporting maintenance.

b. Starting and Warmup - When depressing starter switch use firm pressure to make sure of contact. Hold firmly while cranking. Release immediately when engine starts. If engine does not start readily do not hold starter switch engaged for longer than 15 seconds with a wait period of 30 seconds before pressing start switch again. (This action prevents starter from overheating and allows battery to recuperate.) If engine does not start after five trys have mechanic investigate the cause.

When engine starts allow a 5 minute warmup at 800 to 1,000 rmp. Do not operate at slow idle or allow engine to run erratically. Avoid fanning accelerator or racing engine unnecessarily.

During the warm-up period observe the operation of instruments. If there is no oil pressure indicated within 10 to 15 seconds, stop the engine.

While the engine is operating check for coolant, fuel or oil leaks. Observe operation of fans, pulleys, fan shafts and belts. Report any unusual noise or erratic operation.

After warm-up all warning lights should be "OFF." Battery-generator indicator should indicate in the "GREEN" zone. Coolant temperature should indicate between 120°F to 200°F. Tachometer should have no excessive noises or fluctuations and with hand throttle "pushed in" tachometer should indicate proper idle, 550 to 600 rpm.

c. During Operation - Observe instrument gages frequently. Investigate any condition indicating an increase in operating temperature. Avoid operation of engine at temperatures in excess of 225°F.

An overheated condition can sometimes be relieved by use of a lower gear range or running the engine at a fast idle (800 to 1,000 rpm's) for a few moments.

Operation under extremely dusty conditions will clog the air cleaner and radiator quicker than normal. Under such extreme conditions it will be

necessary to check and clean these items more frequently.

When operating in jungle or heavy underbrush, vegetation can clog the air intake grilles and the radiator resulting in overheating and possible damage. Specific attention to cleaning at the half and after operation will minimize the possibility of damage from overheating.

In some operations it becomes necessary to add additional armor, ammunition, or other supplies. This added weight will not present a problem if proper gear selection is made. Never lug or otherwise labor the engine. Proper range selection and operating practices are contained in the appropriate vehicle operators technical manual.

When necessary to carry additional items assure that stowage does not block the cooling air thereby contributing to overheating.

Never operate without engine compartment access panels, inspection ports, hand hole covers or hull plugs in place. Operation without panels and covers in place contributes to the accumulation of dirt and seriously disrupts the cooling air path which can result in overheating.

To minimize the possibility of "after shut-off boil" and resultant loss of coolant allow the engine to run at a fast idle prior to shut down. About 5 minutes of operation in this manner will usually suffice and stabilize temperatures, however when conditions preclude a 5 minute operation a fast idle for at least 30 to 60 seconds will help considerably.

Avoid prolonged idling as this will cause heavy carbon formation and sticking rings which contribute to other problems.

d. <u>After Operation</u> - Perform prescribed after operation services with particular emphasis on air cleaner, radiator and air intake grilles and screens, oil levels and fuel filters.

Refueling after operation will minimize the possibility of moisture in the fuel as a result of condensation.

MAINTENANCE TIPS

Satisfactory engine operation depends primarily on an adequate supply of air compressed to a sufficiently high compression pressure and the injection of the proper amount of fuel at the right time. Lack of power, uneven running, excessive vibration, stalling at idle, speed and hard starting may be caused by either low compression, faulty injection in one or more cylinders, or lack of sufficient air. The trouble-shooting tables in the applicable technical manual should be referred to for systematic diagnosis of troubles. The following represent some of the more common problems:

a. <u>Hard Starting</u> - Hand crank the engine, where possible at least one complete revolution. If the engine cannot be rotated a complete revolution, internal damage is indicated.

Inspect for blower operation and replace defective parts if necessary.

Check for air leaks in the fuel system. The engine fuel pump is mounted between the primary and secondary fuel filters. The operation therefore is "suction" on the primary side and "pressure" on the secondary side. Air leaks, therefore, would be more likely at the primary or suction side while fuel leaks would be more likely on the secondary or pressure side. The fuel filter gasket and all connections should be checked for air leakage.

No fuel or insufficient fuel can be readily checked by taking a fuel flow check. Disconnect the fuel return line from the fitting at the fuel tank and hold the open end in a convenient receptacle. Run engine at 1200 rpm for 1 minute and measure the amount of fuel. During this operation immerse the end of the hose into the container and observe for air bubbles indicating an air leak on the suction side. Approximately one-half gallon of fuel should flow from the return hose per minute. If fuel flow is insufficient:

(a) Check primary and secondary fuel filter elements and replace either or both if clogged.

(b) If fuel filters are good the fuel pump is probably faulty.

Other reasons for hard starting include: Exhaust valves sticking or burned, compression rings worn or broken, cylinder head gaskets leaking, improper valve adjustment.

b. Abnormal Engine Operation - This includes uneven running of frequent stalling, lack of power and deterioration:

Insufficient fuel can cause uneven running, frequent stalling and lack of power therefore the fuel flow test indicated above should be accomplished.

Faulty injectors can cause uneven running. To locate a misfiring cylinder:

(a) Warm engine to operating temperature.

(b) With engine at idle speed, hold an injector follower down with a screw driver, thus preventing operation of the injector.

(c) If the cylinder is firing properly there will be a noticeable difference in the sound and operation when the follower is held down. This is similar to short circuiting a spark plug in a gasoline engine. If cylinder is firing properly, repeat procedure on other cylinders until faulty one is located.

(d) If the cylinder has been misfiring, there will be no noticeable difference in the sound and operation of the engine.

(e) If the installation of anew injector does not eliminate the misfiring, check the compression pressure.

Insufficient air can cause a lack of power. Check for damaged or dirty air cleaners and clean, repair, or replace as required.

Other causes of abnormal engine operation include: Cold engine, low compression, governor instability, improper adjustments (tune-up), high altitude operation, and oil picked up in air stream.

c. Exhaust Smoke Analysis. Black or gray smoke indicates:

(a) Incompletely burned fuel probably caused by restricted air intake, plugged exhaust, defective turbocharger (if so equipped).

(b) Excessive fuel or irregular fuel distribution probably caused by improperly timed injectors, improper rack adjustment, and faulty injectors. (Lugging the engine will cause incomplete combustion and should be avoided.)

(c) Improper fuel.

Blue smoke indicates:

(a) Cold engine--should clear up upon reaching operating temperature.

(b) Lubricating oil in cylinder probably caused by plugged air box drains, blower oil seal leaking, excessive amount of oil in crankcase, worn or broken rings or scored lines.

White smoke usually indicates misfiring cylinders and same checks apply as for abnormal engine operation.

d. Overheating - There are many causes for overheating and the following include some of the most common:

(a) Low coolant level.
(b) Externally clogged radiator core.
(c) Improper belt tension.
(d) Improper or faulty drive pulleys.
(e) Inoperative cooling fan.
(f) Defective coolant pump.
(g) Defective or improper pressure cap or pressure relief valve.
(h) Defective or missing thermostat.
(j) Operation with panels, hull plates or shrouds missing.
(k) Low engine power.
(m) Lugging engine (improper gear selection).
(n) Faulty or overheated transmission.
(p) Internal clogging of cooling system.
(q) Low engine oil level.

PROTECTION OF UNSERVICEABLE ASSEMBLIES

In the interest of reducing Repair/Overhaul costs, measures must be taken to insure that further damage or deterioration does not occur. As a minimum the following should be accomplished:

a. Remove valve covers and slowly pour one-half gallon of engine oil over the valve train components of each bank. Install

valve covers.

b. Insure that oil filler caps are installed or tape the opening.

c. Tape air inlet and exhaust openings closed.

d. When possible fill the crankcase with oil to a point approximately 15 inches below the top of the oil dipstick tube. (Used oil can be used for this purpose.) Bar engine over at least one complete revolution. Remove drain plug and drain oil. Install drain plug.

e. Insure that oil dipstick is installed. If missing, tape the tube opening closed.

f. Apply a light coat of GAA grease to the front and rear exposed portion of the crankshaft and any other exposed machined surface.

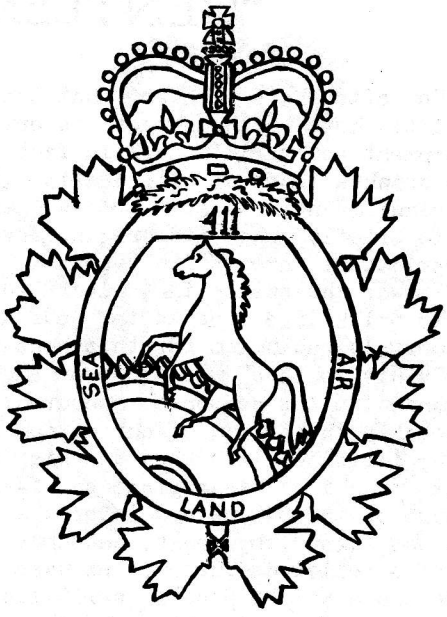
g. Use power plant sling, spreader bars of locally produced pads to protect the air inlet housing and governor cover during engine lifting operations to preclude handling damage.

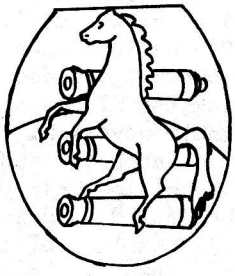
h. Secure assembly in container to preclude movement and possible damage during handling.

j. Attach loose parts securely to prevent movement within container during shipment and handling.

WO D. JANZEN - BMS(L) CFB GIMLI
Submitted badges on the right

Yes Dick, the photo on page 28 of our last issue is in reverse. Sometimes we do this on purpose to get correspondence. (don't the chiefs look good though)
About getting the bulletin published more frequently. We have had problems to numerous to mention and even the future is uncertain. Now about your horses (sorry) badges. The bacic badge outline representing the tri-service insignia, while the central portion would be inserts depicting each trade and number and is removable. The application could be utilized in practically any branch or environment by superimposing a recognizable symbol centrally on the insert.





"GENTLEMEN—THE QUEEN!"

How often have we heard that toast and how little have we thought of its origin, development and variations. In fact, why do we drink a toast at all, and in doing so what significance has it? Let us then attempt to briefly trace its origin, development and variations through the years.

It was the custom in Ancient Greece and Rome to drink libations to the gods and later when mortals qualified for this honour a toast "This to thee" was proposed and the cup handed to the person so honoured. This is probably the origin of our custom of raising the wine glass when drinking a toast. "Health drinking" was a great and favoured pleasure of the Saxons and later when the habit was turned, by monks, into more or less of a religious custom, the wassail bowl became known as the poculum caritatis or loving cup. In some parts of England, and particularly Scotland, it is still known as the "grace cup". This term was given to a bowl of wine passed around by the hostess to induce guests to remain seated until grace was said after the meal.

In the 17th Century when loyalty to the Sovereign was somewhat divided, officers were ordered to drink the King's health as a sign and token of their devotion. To salve their consciences, the Jacobites and their sympathizers used to place their glasses over their finger bowls and so drink "To the King over the water", meaning, of course, the exiled House of Stewart. To avoid this insult, and up until the reign of Edward VII, finger bowls were not permitted in Officers' Messes. It might be interesting to add at this point that Regent, introduced the Regent's allowance to assist poorer officers in meeting their wine and liquor bills. This custom held good until 1919 when the Pay and Allowance Regulations for the British Army were revised.

There are many ways in which the Queen's health is, and may be, drunk. Once they were drunk on bended knee, and, in Scotland, with one foot on the table and one on the chair. In some messes this may still be seen, particularly Highland messes, and the custom is referred to as Highland honours. The usual procedure, however, is to have the wine passed around the table to the right and the last glass to be filled is that of the Commanding Officer. This is done so that he will know that every officer has got his glass filled and is ready for the toast. The Commanding Officer then gives the signal and the Mess President rises, saying "Mr. Vice -- The Queen".

The "Vice", who is generally the most junior officer in the Mess and who is seated at the foot of the table, rises and seconds the toast, saying "Gentlemen -- The Queen". All officers then stand, raise their glasses, and respond. The toast is drunk, and after a slight pause, taking the time from the President, the officers sit down. If the Regimental band is in attendance, the officers stand while the first six bars of the National Anthem are played, holding their glasses in the meantime. The toast is then drunk after the band has finished playing.

It is at this point that I would like to point out the variations and customs that have crept into the toast. In some Regiments all officers respond to the toast by saying "The Queen, God bless her"; in others only field officers may respond, and in a few the officers remain silent. In some messes the custom is to drink "no heel taps", that is, a bumper glass (brim full) drained at one swallow. The expression "heel tap" came from the reference to one thickness of leather making up the heel of the old boots.

Some Regiments do not drink the toast at all and others drink it only on special occasions; some - and indeed most - Regiments stand for the toast, some remain seated, only the President and Vice President standing, and others remain seated throughout. I will, a little later on, give examples of these various deviations from the normal and quote, if possible, the incident that gave rise to the custom. However, before doing so I would like to state that as far as the Canadian Army is concerned any deviation from the normal method of toasting the sovereign is a result of affiliation with a British Army unit that observes some custom. However, many Canadian Regiments observe special days of remembrances and it is possible that some custom has been carried on that as a result of usage has become a tradition of the Regiment.

The following are some examples of the deviations by Regiments of the British Army, together with the reason for the custom which has now become tradition.

The Royal Navy and Royal Marine Regiments

remain seated during the toast while they are afloat. This custom arose from the fact that years ago wardroom ceilings were so low that it became quite a game to avoid hitting the beams and to avoid a loss of dignity inherent with the dodging and darting, officers were permitted to remain seated.

Some line Regiments of the British Army have during their period of existence served as Marine regiments and to commemorate the occasion remain seated during the toast. The Rifle Brigade remain seated because their loyalty has never been questioned. The King's Own Shropshire Light Infantry do not drink the toast and this arose from an incident in Brighton in 1821. During the course of a Regimental dinner, at which King George IV was a guest, he declared that, as a result of the actions of the officers in dispersing some rioters who threatened him while he was attending the theatre in Brighton "Such loyal gentlemen as these need never drink the King's health or stand while the anthem is being played".

During the reign of Victoria the Scots Guards remained seated during the toast, except for the President and Mr. Vice. Those seated drank the toast in silence. In the Royal Tank Regiment the toast is drunk in the normal manner however, the words "God Bless her" are optional to everyone. On guest nights the Gordon Highlanders drink the toast in silence. Unless a member of the Royal family is present the 17/21st Lancers do not drink the toast, and in the Oxford and Buckinghamshire Light Infantry it was the sentiment that "it was wrong and unregimental to parade loyalty; a thing to be taken for granted". Consequently the toast is not drunk.

The list is almost endless and it is safe to say that no two regiments do the honours in precisely the same manner. Like life, where variety is the spice, so tradition and custom make mess life unusual and interesting. What a grasp tradition and custom have, how rigid and persistent.

Canadian Army Journal, May 1952

Don't be afraid to ask stupid questions, they're a helluva lot easier to explain than stupid mistakes!

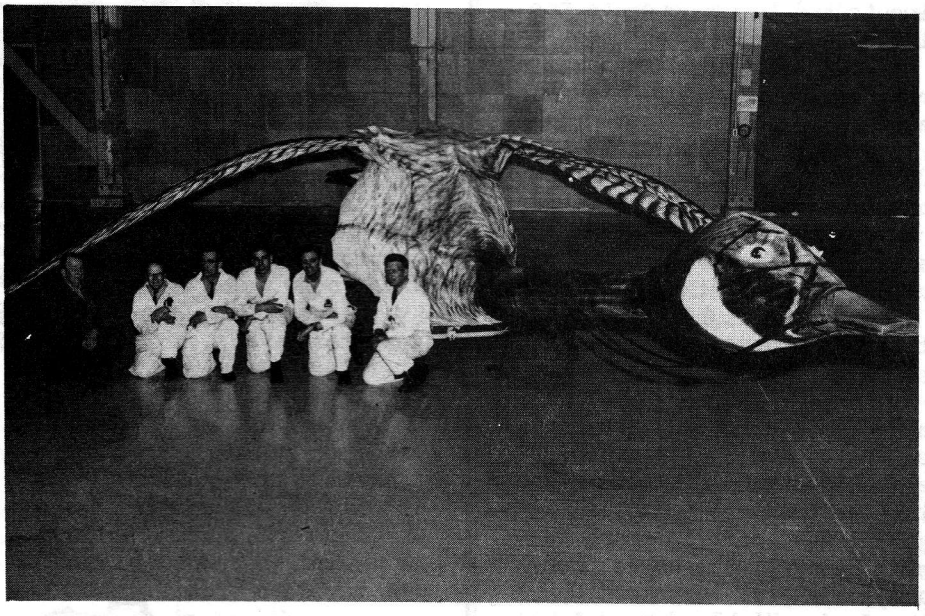
CAPT I.E. PATTEN - CFSAOE LOTC
Submitted the above badges

The basic pattern was followed with the central portion containing a gear or cog representing engineering generally and the letters LORE superimposed. LORE standing for Land Ordnance Engineering.

The lower badge could be used as a collar dog or breast pocket badge.

QUACK QUACK

By: Capt K.C. Pirt - LORE (AMCRO) dated Mar 70



left to right: Sgt Stevenson, Cpls Arsenault, Donohue, Clairmont, Warner and Clark.

Contrary to all rumours, CFB Rivers still exists and continues to train CF Pilots on the Hiller CH112 helicopter. The base at Rivers has to date, escaped the "closure axe" because of the ingenuity and efforts of the RCEME aircraft technicians shown in the above photo.

We are all aware of our ability to camouflage a field workshop in Europe, so that it resembles a Schutzenfest, complete with beer tents and diligent tradesmen striving to imitate a German celebrating some nebulous event.

From this training of "RCEME in the Field" we have created the largest known species of the "Canada Goose", and while training pilots to fly geese, we are also supporting the Manitoba Centennial Year (1870 - 1970) celebrations and could make this the Mecca of the American hunter.

In reality, the "goose" was prepared from a training aid to mark the sad occasion of the disbandment of 408 TAC (F) Sqn. This sister flying unit has had a valorous and colorful role in war and peace but has met the same fateful decision recently placed before our Militia RCEME Tech Sqns across Canada.

RAPIER SURFACE TO AIR GUIDED WEAPON

Submitted by

MWO J.D. SERLE and WO J.H. DOUGAN

Rapier is a fairly new surface to air guided weapon system in which the Canadian Armed forces have shown an interest. It is a weapon system designed for use against low flying supersonic aircraft in an attack role, or slower aircraft such as air OP or helicopters. On some of its trials and displays, it has proven quite spectacular in its effectiveness. Other drawing points are its simplicity, requiring only three people to put it into action and one person to operate it, and of course its price tag, which, in an era of exotic weapons with exotic prices, is refreshingly low.

The system employs an automatic search radar in conjunction with an IFF transmitter/receiver which lays an optical tracking unit and the missile launching beams on the target in azimuth. The operator then takes control of the optical tracker (and as a result, the launcher beams) and tracks the target optically by means of a joystick controller. On the periphery of his field of view, the operator can see lamps which are used to tell him whether or not he has any chance of a hit, or whether or not a chance will present itself in the near future. At the opportune time the operator presses the FIRE button, launching a missile in the direction of the target. The missile is radio-controlled by commands that are derived by a computer from information obtained by a television tracking system, modified by radar information and tracking rates. The entire sequence of events occurs very quickly and except for the tracking phase, and the decision to fire, is all automatic. With the radar detecting a low fast flying target at the horizon, sufficient time is available for the operator to get a round away well before a close cross-over, and easily two rounds before the target is out of cover following a close cross-over.

The fire unit consists of three separate packages, connected by cables. The Launcher embodies the launch rails for four missiles, and contains the automatic search radar, the IFF transmitter/receiver, the computer, the radio-control transmitter, and a hydraulic drive system. The Tracker can be located up to 100 feet from the Launcher and contains a small operator's console, the tracking optics, the servo control system, a small computer and a television camera used for missile guidance. The Engine Generator is a gasoline engine driven alternator which supplies the power for both the fire unit and the associated automatic test equipment.

Because of the complexity of the circuitry and wiring, much of testing becomes extremely tedious and slow, if not impossible. Because of this, most points requiring monitoring have been connected to plugs or sockets on the accessible outer parts of the equipment. The Automatic Test Equipment is cabled to these testing plugs and sockets, and, under control of a taped series of commands, automatically simulates inputs, and decides serviceability. The automatic test equipment is mounted on a Land Rover with a trailer load of spares for Rapier and for itself. The entire group is termed Forward Rapier and Test Vehicle, abbreviated FRTV.

The FRTV is a troop repair equipment, and is designed and programmed to work to first line level. At battery level, a similar automatic test equipment is mounted in a three ton venicle, for the purpose of testing troop spares rejected by FRTV. Another three-ton vehicle is set up for testing and repair of optical and hydraulic units. The two three-ton vehicles are called the Battery Repair and Testing Facility abbreviated BRTF. These test equipments are quite sophisticated and very expensive, and any government intending to purchase Rapier is certainly going to look seriously into the economics of testing and repair.

The interest Canada is showing in the Rapier system gives new life to those trades in the Canadian Armed Forces which in the past have been connected with anti-aircraft, an almost forgotten though necessary speciality long missing in Canadian Defence.

It is an exciting prospect to those in Radar or Computer fields, and to electro-mechanical tradesmen in optics and servo-mechanisms. Artillery-men must be greatly interested in this light simple weapon system as will ground defence people in the air element. The sea element must also have some interest since a similar weapon system is being developed for the Royal Navy under the name of Sea Wolf. Perhaps it will be a new weapon system with a new concept for Canadian Armed Forces' new organization.

CANADIAN INVOLVEMENT IN RAPIER

In September 1968, CAF interest in Rapier developed to the point where two RCEME technicians were posted to the Trials Establishment Royal Artillery (abbreviated TERA) at Ty Croes Camp on the Isle of Anglesey, North Wales.

First to arrive was Sgt JH (Paddy) Dougan (since promoted to WO) followed closely by MWO JD (Dave) Serle. Both spent six weeks at the School of Electronic Engineering REME at Arborfield, Berkshire. Most of the days were spent reading the British equivalent to our EME Manuals on Rapier, but since most of the material was of a secret nature at the time, the evening hours had to be spent on studies of old English Pubs, English drinking habits, English ales and beers, and Canadian hang-overs in Britain.

Following the Arborfield Campaign, came six months at the Factory of British Aircraft Corporation (Guided Weapons Division) at Stevenage, Hertfordshire, about 35 miles North of London. Then Paddy went on the Trials Establishment in North Wales while Dave remained at BAC to become involved in the FRTV programme.

In May of 1969, eight officers and senior ranks from the Royal Canadian Artillery arrived at TERA to take part in handling trials. When they left in August 1970, they left one MWO behind to observe and assist in further trials. It now appears that he, Paddy and Dave will be remaining in Britain till sometime in mid 1971.

Photos of the RAPIER are on the following pages:

False Alarm

Now snowsuit knees begin to fray
And mitten pairs go half astray
And tots exhibit feet of clay;

Now idle sleds commence to rust
And roller skates become a must,
Returning robins readjust;

Now sunshine graces each demeanor
And muddy lawns grow daily greener,
We send our woolens to the cleaner;

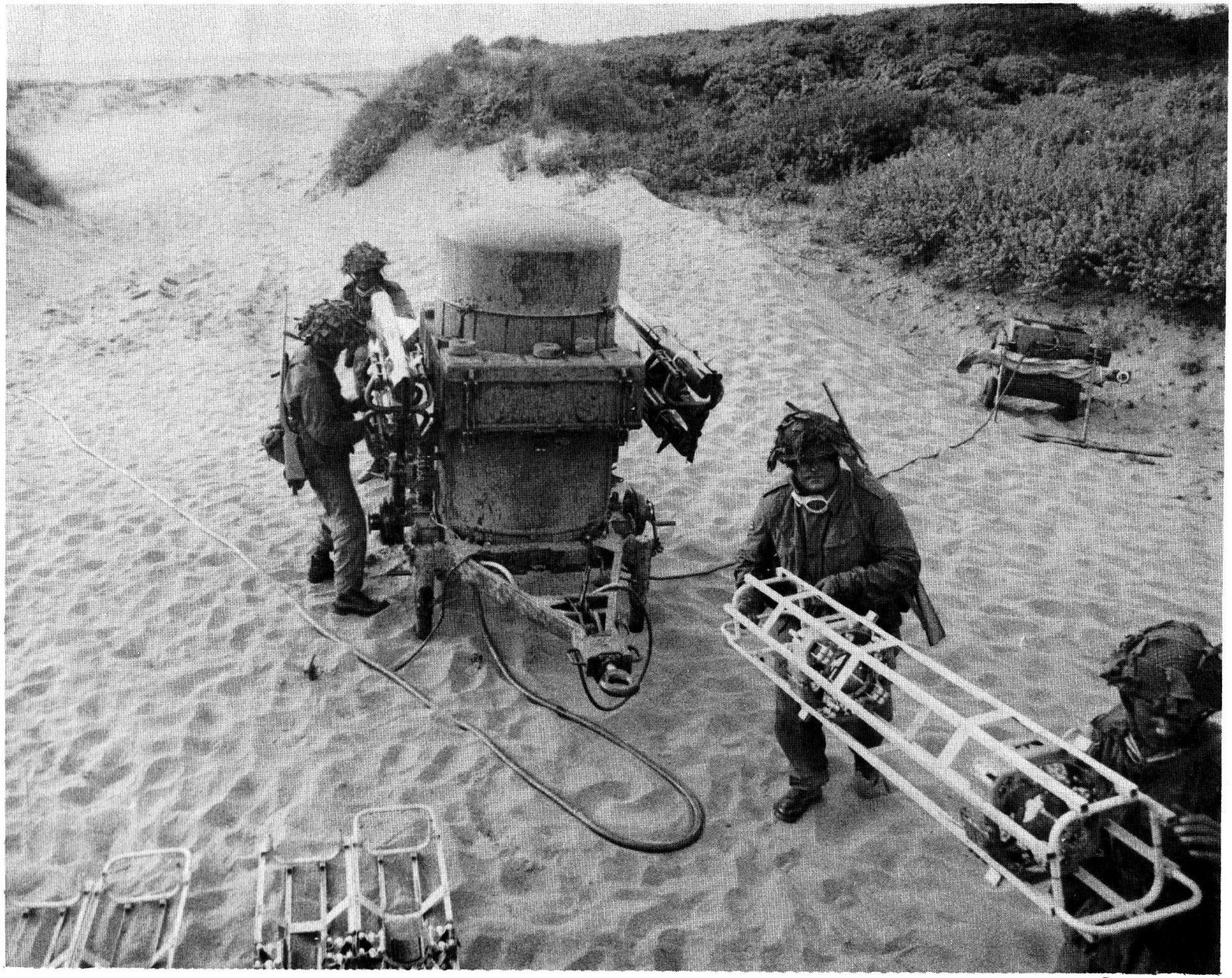
In readiness the earth awaits
Spring's bonus days at bargain rates;
Poised are the poet laureates

Their vernal verses to compose
Reviewing novel rhymes for rose
In cadence clear, yet grandiose;

And then it snows.

THEY GET LETTERS: Social Service and Welfare agencies are forever receiving letters - plaintive epistles, angry ones, explanatory letters, inquiries. The following are excerpts from letters received recently by one welfare organization ... "I am glad to report that my husband who was missing is dead" ... "I cannot get sick pay. I have six children. Can you tell me why?" ... "I am forwarding my birth certificate and six children. I had seven but one died, on a half sheet of paper"... "You have changed my boy to a little girl. Will this make any difference" ... "I am very much annoyed to find that you have branded my son illiterate. This is a dirty lie, as I was married a week before he was born."

RAPIER LOW LEVEL ANTI-AIRCRAFT MISSILES BEING UNLOADED FROM THEIR TRANSPORT CONTAINERS FOR LOADING ON TO THE LAUNCHER.



RAPIER LOW LEVEL ANTI-AIRCRAFT MISSILE SYSTEM DEPLOYED FOR ACTION.

RAPIER LOW LEVEL ANTI-AIRCRAFT MISSILE SYSTEM DEPLOYED FOR ACTION.

THE SPACE AGE

HOW ON EARTH DID WE GET TO THE MOON

By; Capt A. Nellestyn Ph.D.

In Kaluga, U.S.S.R., Stands a tombstone incribed on which is the epitaph:

MAN WILL NOT STAY ON EARTH FOREVER,
BUT IN THE PURSUIT OF LIGHT AND SPACE
WILL FIRST EMERGE TIMIDLY FROM THE
BOUNDS OF THE ATMOSPHERE AND THEN
ADVANCE UNTIL HE HAS CONQUERED THE
WHOLE OF CIRCUMSOLAR SPACE.

The epitaph was the vision of the father of astronautics Konstantin Eduardovich Tsiolkovsky who lies buried beneath it. Tsiclkovsky a shy self-taught Russian schoolteacher, had before his death in 1935 prodigiously applied the theories of Kepler and Newton to space exploration. To elaborate on the scientific world's lack of response to Tsiolkovsky vision during his life and for some time thereafter would be superfluous.

Thirty-four years after his death there stands on the desolate man-imprinted surface of the moon the highly sophisticated awe-inspiring results of man's space efforts a tombstone, Eagle's descent stage,attached to which is a small metal epitaph bearing the words:

HERE MEN FROM THE PLANET EARTH FIRST
SET FOOT UPON THE MOON,
JULY 1969 A.D.
WE CAME IN PEACE FOR ALL MANKIND.

The insatiable curious and exploratory nature of man has projected him beyond his own planet.

Much has been written of man's recent space exploits; justifiable euphonic phrases and heroic glamourous reports have been offered for consumption. Yet little has been said of the theories of Copernicus, Kepler, Newton and the other predecessors of today's highly educated specialists and enormous computors by whose accomplishments vision was for a moment eclipsed by reality. This was just as true of yesteryear as of today. But instead of the emphasis on the heroic and the glamourous, early theoreticians feared riducule and even repercussions from the religious hierarchy.

In the sixteenth century the Polish monk Copernicus proposed that the traditional belief that the earth was the centre of the universe was erroneous and that in fact the earth was one of many planets revolving about the sun. Kepler elaborated on the highly controversial Copernican science in his pseudo-fiction book SOMNIUM (Dream). This was the only method by which Kepler could expound theories related to a sun-centred universe without retaliation from the church which dogmatically held that the earth was the centre of the universe.

By mathematically examining the detailed observations of the Danish astronomer Tycho Brahe, the German scientist, Kepler, was in 1609 able to propose the first of three laws relating to planetary motion. The first law, that of ellipticity, stated that a planet does not revolve about the sun in a perfect circular orbit but in an elliptical one. This law applies also to a lesser body than a planet. Hence as the sun is the elliptical focus for the earth, so for a satellite of the earth, the earth's centre of mass acts as a focus of the ellipse. Using Kepler's law of ellipticity allowed men to determine where the moon would be at any given time.

Kepler's second law recognized that as a satellite moves in its orbit the line joining the satellite's centre to the focal point, the body around which the satellite is orbiting, will always sweep out equal areas in equal periods of time. Thus the speed at which an elliptically orbiting body moves through space is inversely proportional to the distance between that body and its focal point, i.e. the orbiting body loses speed as it rises in orbit.

Kepler's third law states that an orbiting body's period of revolution is proportional to its mean distance from the primary focus of its orbit. The law, also known as the Harmonic Law, deals with the relationships between distances of the satellites from their primary body and the time required for one full revolution around that body, the period of revolution. Thus

the higher the orbital path is from the centre of the body orbited, the larger the orbital period of revolution.

For example, the predecessors of the manned satellites orbited the earth at altitudes little higher than 100 miles; an altitude at which the craft travelled approximately 17,400 miles per hour thereby taking about 90 minutes to orbit the earth. The moon, by comparison orbits the earth at a mean altitude of 239,000 miles, travels only about 37 miles per min and takes 27 1/3 days to complete a revolution about the earth.

However, it was not until Isaac Newton's contemplation of the falling apple that an answer as to what force keeps planets and satellites moving in their orbits was offered. Newton's formulation of the universal law of gravitation in 1666 provided the key. The law of universal gravitation states that every body in the universe attracts every other body with a force that is directly proportional to the product of the masses of the two bodies, and is inversely proportional to the square of the distance between those bodies. This force, gravity, causes bodies in the solar system, the sun and its planets, the planets and their satellites to exert a mutual pull on each other.

According to this principle the pull exerted by the earth's gravity decreases as the distance from the earth increases. Applied to rocketry, the greatest burst of power is required to make the initial escape from the earth's surface; only finite rocket power then being necessary to project a spacecraft further and further into space.

In moon exploration the diminishing force of gravity, however, is a blessing in disguise for to escape the surface of the earth a spacecraft must rocket with a degree of power sufficient to reach the moon but not such as to escape the bonds of earth's gravity altogether. It is at a velocity of 26,000 miles per hour where a moonshot might instead of reaching the moon accelerate a spacecraft into an orbit around the sun. A velocity of 24,200 miles per hour is sufficient to allow a spacecraft to head towards the moon into what is in fact a highly elliptical earth orbit. This velocity is such as to enable the craft to accelerate away from the earth's maximum gravitational pull yet slow enough to remain under the earth's influence. When the craft is 38,900 miles from the moon it becomes subject to the moon's gravitational pull, that is to say, it is beyond this point that the moon's gravity is stronger than the earth's. Thus during the whole of the spacecraft's moon journey it is influenced by gravity; first the earth's and then the moon's.

Newton's three laws of motion further enabled man to design for space travel. The first law states that a body remains at rest or if in motion will continue to move in a straight line unless acted on by some external force; this property being called inertia.

Thus in the absence of an external force such as gravity and the frictional drag caused by the earth's atmosphere, the inertia supplied by a rocket's powerful engines would cause the spacecraft to follow a straight path away from the earth, thereby making orbit impossible.

In order that a rocket not follow a trajectory which would result in its falling back to earth such as experienced by a bullet fired from a rifle, its engines must furnish a thrust that would overcome both gravity and the earth's atmospheric frictional drag. The thrust required to achieve orbit, expressed in terms of velocity is 17,400 miles per hour. For convenience thrust is expressed as velocity as, although thrust is directly proportional to weight to be rocketed, the critical velocity is more or less constant. At this velocity an equilibrium is established between gravity and the inertia of the rocket. The orbiting satellite follows a curved path as though it would fall back to earth. But as the earth's surface, being round, falls away from the satellite at the same degree as the satellite falls, the satellite falls around the earth; never reaching the surface.

Associated with the orbital balance of gravity and inertia is the oft used misnormer "zero gravity". Zero gravity is rather weightlessness as minifested by unsecured astronauts floating about in orbiting spaceships. Orbiting satellites are not beyond the influence of gravity. Weightlessness is the result of the gravity-inertia equilibrium.

For an orbiting body to return to earth, the gravity-inertia equilibrium must be altered in favour of gravity. That is to say the orbiting body's inertia must be decreased for the earth's gravitational pull

remains constant. Decreases in inertia are accomplished by the firing of rocket engines expressly designed for that purpose.

As long as a satellite maintains the same velocity, it continues to orbit earth at the same altitude. Then how is it that satellites return to earth and subsequently "burn up", disintegrate, in the earth's atmosphere. This phenomena can be related to the same frictional drag forces which cause a moving object on earth to come to rest. It is important, however, to point out that orbital decay is altitude related.

Orbital decay, the ever decreasing orbital altitude of satellites is atmosphere influenced. Although the earth's atmosphere, bounded to earth by gravity, is a band 26 miles wide, there still exists a vast number of molecules and simple atoms beyond the atmospheric band which will in time decrease a satellite's orbiting velocity thereby allowing gravity to predominate. The resulting state of gravity-inertia imbalance, with inertia decreasing, draws the satellite into ever-decreasing orbital heights and finally the satellite is drawn into the 26 mile earth atmospheric band where it burns up. However, the molecular and atomic density to altitude ratio decreases with increasing altitude such that satellites orbiting earth at 100 miles remain aloft for a few weeks in comparison to the moon, a vast satellite, which has remained in earth orbit millions of years and is likely to remain there for many more.

Newton's second law of motion states that a body under the influence of a force accelerates in the direction in which that force is applied; the degree of acceleration being directly proportional to the size of the force and inversely proportional to the mass of the body being accelerated. That is to say, the greater the mass of the body to be moved, the greater is the force required to accelerate it and consequently the greater the force required to stop or slow down the object. Thus the force required to lift and maintain in flight a rocket such as Saturn 5 must be in excess of the weight (mass) of the space vehicle. Likewise the force produced by Eagle's decent stage braking rockets during its descent to the Moon's surface had to be in excess of Eagle's weight.

Perhaps the most vexing enigmatic rocket related phenomena is that of the ability of a rocket to propel itself through a vacuum. Both scientists and laymen have often ennunciated rather dogmatically that a rocket cannot travel through a vacuum. The principle by which a space vehicle is able to travel through vacuum is explained by Newton's third law which states that to every reaction there is an opposite and equal reaction. This is the underlying rule without which no rocket could lift off let alone travel through vacuum. It is not the equal and opposite reaction of a rocket's exhaust gases on the earth's atmosphere which propels a rocket through space but it is in fact the equal and opposite reaction of the exhaust gases upon the rocket which propels it onwards. The presence of the atmosphere only serves to hinder flight as the rocket must overcome the frictional drag forces of the atmosphere. Thus the rocket engine works more efficiently in vacuum.

Without the theoretical background to space travel worked out by Kepler and Newton man's rocket efforts would still be confined to Chineses firecrackers on the first of July. Between the theoretical work of these early scientists and Armstrong's and Aldrin's moon walk exists a span of time devoted to the practical efforts to transform theory into concrete reality. Names such as Tsiolkovsky, Goddard, Oberth, Kondratyuk and von Braun come to the front.

Tsiolkovsky, inspired by Jules Verne, was the first to suggest the rocket as a vehicle with which to escape the bonds of earth's gravity. This great Russian solved a number of the engineering problems of spaceflight. Not only did he propose the rocket but he also suggested that liquid fuels would provide higher exhaust velocities, greater thrust, than solids. Liquid fuels have the advantage of being lighter than solid propellants and consist of simple atoms whose exhaust gases accelerate out of a rocket's nozzle at speeds far in excess of the solid fuel exhaust gases. Tsiolkovsky proposed the use of liquid fuels such as kerosene, liquid hydrogen and liquid oxygen. The multiple-stage rocket can also be attributed to him. He noted that as each stage consumed its propellants it would in turn be discarded, thereby keeping the weight of the vehicle as low as possible as it continued on its journey through space.

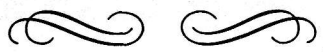
The actual task of combining theory with practical experimentation is the work of an American, Robert Hutchings Goddard. His work on rocket design, propellants and related experiments flowered during the early nineteen hundreds. His employment, far removed from rocketry, by the US War

Department during the Second World War was an unfortunate decision, especially as, due to the farsightedness of the German Hermann Oberth, the Wehrmacht was engaged in rocket research at Peenemuende on the Baltic Sea which, under the brilliant leadership of Werhner von Braun, resulted in the harassing of London by Germany's V-2 rockets.

President JF Kennedy's decision in 1961 committing the United States of America to put a man on the moon by the end of the decade brought another obscure scientist to the fore. That scientist was the Russian Yuri Vasilievich Kondratyuk who in 1916 - 1917 calculated that the lunar-orbit rendezvous, LOR, was the most logical way of achieving a lunar landing with the maximum conservation of propellant. For planetory exploration Kondratyuk wrote, "The entire vehicle need not land, its velocity need only be reduced so that it moves uniformly in a circle as near as possible to the body on which the landing is to be made. The inactive part (the landing craft) separates from it, carrying the amount of active agent (propellant) necessary for landing the inactive part and for subsequently rejoining the remainder of the vehicle". The time limit imposed by President Kennedy and the urgings of John C. Houbolt of NASA finally convinced the Americans that LOR was indeed the only of the five proposed moon landing methods feasible. It is interesting to note that the Russians did not adopt Kondratyuk's idea as evidenced in the crash of Luna 15 on the Moon's surface.

Notwithstanding NASA's contributions one might well have said of NASA's predecessors, "Never in the field of human endeavour was so much owed by so many to so few". Now that man has shown that even during times of peace his intellectual capacity can be mobilized to accomplish so amazing a feat in such a short time, will he heed the admonishings of other voices from the wilderness which cry out:

MAN IS BOUND TO EARTH NOT BY GRAVITATIONAL FORCES BUT BY THE SOCIAL INJUSTICES AND INADEQUACIES WHICH HE HIMSELF CREATED. CONQUEST OF OTHER PLANETS WILL NOT ABSOLVE HIM OF HIS EARTHLY OBLIGATIONS.



Instant 'Buzzwords'

By; LCOL D.C. Richardson, REME
The Craftsman - Jul 70

Technology has created a new type of jargon that is nearly as incomprehensible as it is sophisticated. I recently came across an unusual device called an 'Instant Buzzword Generator' which will help you master this jargon and putyou on top of the Oneupmanship League! Using the Generator you can produce an almost endless variety of intelligent-sounding technical terms.

The technique is easy to use; merely select a digit from each of the three columns below and combine the words opposite each number to form your own spell-binding technical jargon. For example, select 3, 9 and 0 and you generate 'parallel policy options', an expression bound to command instant respect - and confusion It should be a very useful weapon in the Ministry!

Column 1	Column 2	Column 3
0 integrated	0 management	0 options
1 total	1 organizational	1 flexibility
2 systematized	2 monitored	2 capability
3 parallel	3 reciprocal	3 mobility
4 functional	4 digital	4 programming
5 responsive	5 logic	5 concept
6 optical	6 transitional	6 time-phase
7 synchronized	7 incremental	7 projection
8 compatible	8 third-generation	8 hardware
9 balanced	9 policy	9 contingency

MORAL - WATCH YOUR LANGUAGE

DESK BASKETS

IN OUT HO HUM
how about
FLOTSAM, JETSAM and SALVAGE

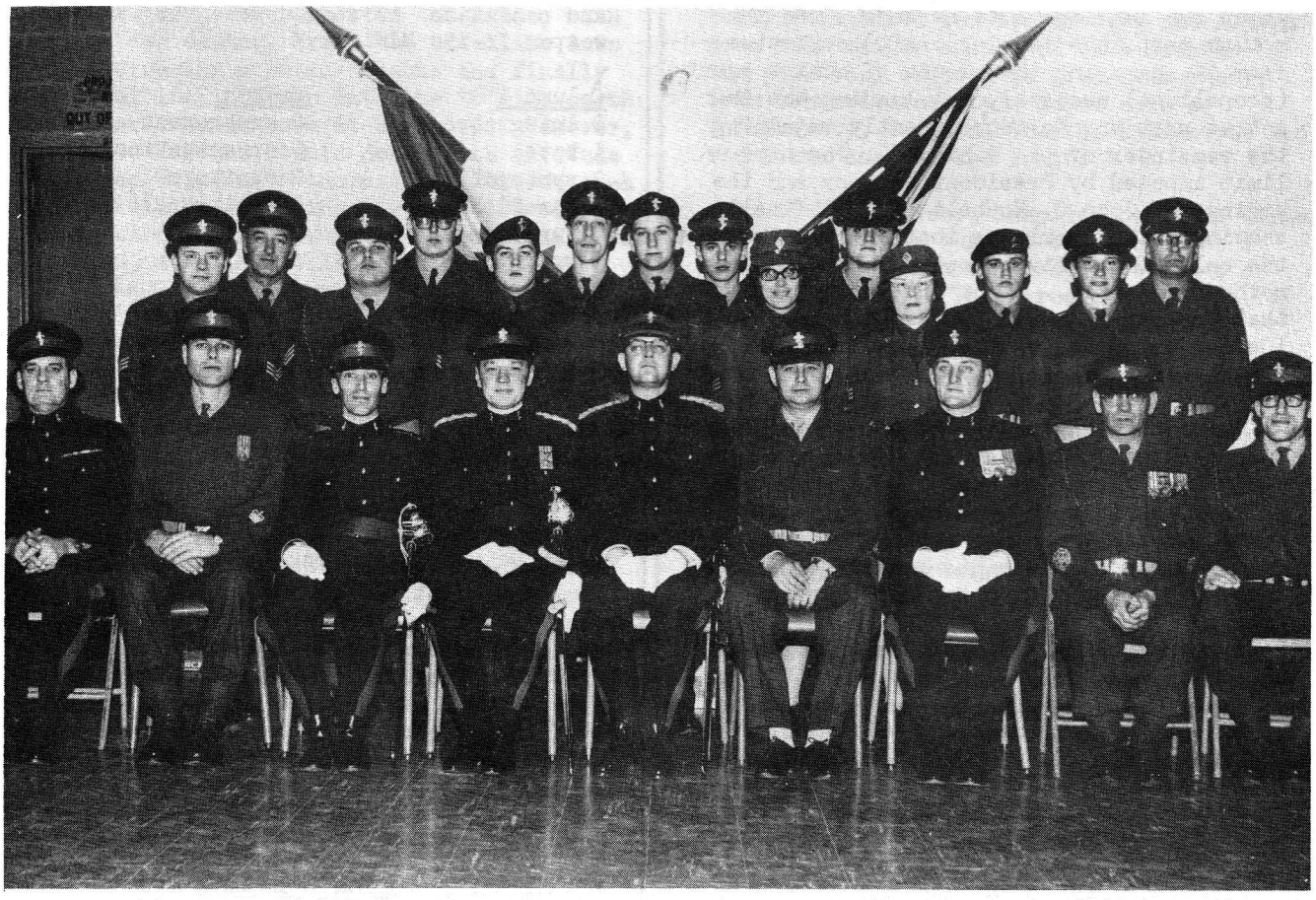
BLACK FRIDAY

BY: MAJOR K.C. TURNER - OFFICER COMMANDING

37 Technical Squadron RCEME (M) Saskatoon, a detached sub unit of the Regina Service Battalion, was recently placed on the Supplementary Order of Battle. The photographs shown were taken on the night of the final parade, which we called "Black Friday" as the parade was held on Friday the 13 May 70.

The group photo is what was left of the Squadron on the final parade as some of the personnel had already been posted out of the unit at that time. The person on the far left in the front row is MWO VRC Pomeroy of the Saskatoon Det I Staff, our chief technical advisor, and a good one he was.

The other photo depicts the ceremonial handing back of command as LCOL SC Shepherd, Commanding Officer of the Regina Service Battalion receives the sword from Maj KC Turner.



collision corner

Submitted by: Major C.A. Millar - CFHQ/DOM
(extracts from BODYSHOP - JAN/FEB 70)

TROUBLE-FREE MASKING

When storing masking tape, don't leave tape on cans containing solvents or thinners or in the sunlight for long periods. Make sure you store it in a cool, dry place.

Here are some pointers on applying masking tape:

(1) make sure the surface to be masked is thoroughly clean and dry

(2) check to be certain that tape edges are adhered firmly to the surface being masked

(3) remove masking tape from the job at right angles to the surface and

(4) avoid stretching the tape when masking a recessed area. Lay the tape into the recess and apply pressure.

PAINT STRAINER DISPENSER

It can be something of a problem to keep paint strainers clean, so try making up your own dispenser.

The dispenser is simply a discarded 3 lb coffee can. This is inverted and secured to the wall with a screw. The strainers are then pushed in from the bottom, and are held in place by the ridges around the can. A filter can be removed by pulling on the tip of the cone.

The filters can also be loaded from the top, if this part of the can is cut out. A cover should then be used to keep the filters clean.

FOR A CLEAN EDGE

If you're using masking tape to paint straight edges, there's a danger of paint building up between the car finish and the edge of the tape.

This can be prevented by rubbing the edge of the tape with wax before using. The paint won't stick to the waxed edge, and the tape can be removed at any time to leave a clean edge.

HOW TO AVOID A HOT-SPOT

In finish grinding a panel, it is important that you don't grind a hot spot, which would distort your job. Punch 1/2 inch holes in the disc; it greatly reduces the heat set up in the grinding process and also improves the cutting ability of worn discs.

After every grinding operation, use a damp cellulose sponge to cool the metal. In one or two tries you can eliminate the warped surfaces caused from grinding heat. The punch for making holes can be made from steel tubing by grinding one end to a sharp edge.

DECAL BLISTERS

When installing decals of any kind, including those on station wagons air bubbles often remain after the decal has been installed.

Use a hypodermic syringe, both to remove the air and to insert more adhesive. The microscopic hole left by the syringe is filled by the adhesive, and is invisible.

Disposable syringes are available at chemists and cost very little.

FIXING WATER LEAKS

Complaints of water leaking into the trunk compartments are often difficult to run down.

If these leaks occur at the deck lid emblem and key lock assembly, here's what to do: Remove the emblem and lock assembly and apply caulking compound over the backside of the assembly hole.

JOINT BRAZING TIP

If you want an extra strong brazed joint, it's advisable to tin both surfaces with the

brazing rod first. This will make possible a good overlapped joint and the filler metal will provide more strength than if metal is piled on top of the joint.

This technique is most helpful when you have to braze a tab on a frame or body reinforcement in order to pull it back into shape.

SANDING TECHNIQUE

Bodymen who are having trouble sanding plastic or rough spots on curves or corners that cannot be reached satisfactorily with a sanding block or smoothed out well enough by hand should wrap a piece of sandpaper around a dried out sponge.

The flexibility of the sponge will follow the contour needed and give a smooth surface.

SOLDERING AID

The reverse contours and other difficult places to get at with a file on many late model cars make soldering a problem. This can be overcome by using a piece of felt the size of the palm of your hand soaked in soldering tallow or motor oil so it will not burn quickly.

Using this, you can then wipe the solder into those hard-to-reach places fairly easily and feather it adequately.

PAINT RUN REMOVAL

A run in enamel, if close enough to the bottom of a panel, can be flushed down by drenching it with pure thinner, then reblending with the enamel.

In the case of a heavy run while the coating is still wet, use a soft bristled brush, moistened with reducer, to work out this heavy area as smooth as possible.

When the panel dries sufficiently to sand, you'll have no trouble with sanding, due to the absence of heavy, soft paint beads.

WISDOM: Knowing what to do.
SKILL: Knowing how to do.
VIRTUE: Not doing it.

SWEET TALK FROM AN EXECUTIVE SUITE

We're always saying that the art of letter-writing is dead. Killed, we say, by the telephone, the telegram, the clever greeting cards.

Today I heard a story which, if it's true, proves that there are still some splendid letter writers around. If it's not true, it's still a good story. It goes like this:

A businessman who had travelled by air from Miami to New York found out that his luggage was missing. He didn't wait for any lengthy investigation. He sat right down and wrote a letter to the president of the airline.

"I just want to tell you," he wrote, "that I have never had a more enjoyable flight than my through flight from Miami to New York. A most delicious meal was preceded by a well iced cocktail. A charming stewardess and a pleasant steward saw to my every want. As I leaned back in my comfortable chair, a chair even more comfortable than my favourite chair at home, I decided that no trip could be more perfect."

Then, after he had signed the letter, he added this:

"P.S. How the hell can you lose baggage on a through flight like that?"

Within 24 hours he had a reply from the airline's president.

"It's an extremely satisfying experience, wrote the president, "to have a letter such as yours reach my desk. During the course of the year many letters come my way, but I think none has ever impressed me more. Speaking for my company and for myself, we are delighted that we gave you the good service we always try to give all our customers."

Then, after signing his letter, he added:

"P.S. Damned if I know. But I'm going to find out."

OVERSPEEDING OF VEHICLE ENGINE TRUCK, 5-TON 6X6 SMP

(reproduced from MOTOR TRANSPORT SAFETY BULLETIN - Nov 70)

A serious accident occurred when a truck, 5 ton, 6x6, SMP was being driven down a steep grade. The accident investigation revealed that while the vehicle was descending the hill, a mechanical failure took place in the vehicle's engine. The damage resulting from this failure was such that the driver lost control of the vehicle and he and the co-driver had to jump clear of the vehicle. Both personnel were injured. The vehicle crashed into a rock face and was a total wreck.

In investigating the accident the following facts were determined:

a. The failure of the engine encompassed a burst flywheel and a disintegration of the clutch and pressure plate assembly.

b. The speedometer and tachometer were not operating immediately prior to and at the time of the accident.

From the sequence of events it appears that the burst flywheel resulted from the force generated when the driver geared down while the vehicle was travelling at an excessive speed for this gear change. At this point the speed from the rear wheels being transmitted to the engine was driving the engine in excess of its governed speed.

While it cannot be definitely established that this incident was the sole cause of the flywheel bursting, the stress set up contributed to the ultimate failure. The engine may have been overspeeded many times previously. Contributing factors were the non-operating condition of the instruments at the time which precluded adequate control of vehicle and engine speed prior to the accident.

Attention is directed to EME Manual - Vehicles - G909 Instruction 3 which states in part "when the vehicle engine is being used for braking on downgrade operation, select a gear range that will provide the necessary braking effect without overspeeding the engine and use the vehicle brakes intermittently to reduce road speed.

CAUTION

Extreme care must be exercised to prevent this engine from reaching speeds in excess of 2800 RPM.

As a further precaution, considering the sensitivity of this engine when overspeeded, this vehicle should not be operated when either the speedometer or tachometer are inoperable. Drivers should be cautioned that, if either of these instruments fail to function during a trip, they should proceed for the balance of the journey or to the nearest repair facility at a reduced speed.

ANNUAL RCEME (ONTARIO) BONSPIEL

The eighth Annual RCEME Bonspiel was held at CFB Borden on the 26 - 27 - 28 of Mar 71. The first stone was thrown by Col A.H. Middleton, Base Deputy Commander of CFB Borden at 0810 hrs 26 Mar 71 after which the spiel got underway.

38 rinks competed for 3 trophies and the three days of spieling provided some excellent curling. The competing rinks came from Ottawa, Petawawa, Kingston, Downsview, London, North Bay and CFB Borden.

The Borden, Base Maintenance section rink consisting of Skip Red Sturgess, Vice Lee Doiran, Second Ken Wayner and Lead Ro y Smith won the "A" event and were awarded the 14 Coy RCEME Trophy.

The "B" event was won by a rink from DOM 3 CFHQ, Skipped by Lou Barker, Vice Mel Pounder, Second Alex Lascelles and Lead Bob Ewing. They were awarded the RCEME School Trophy.

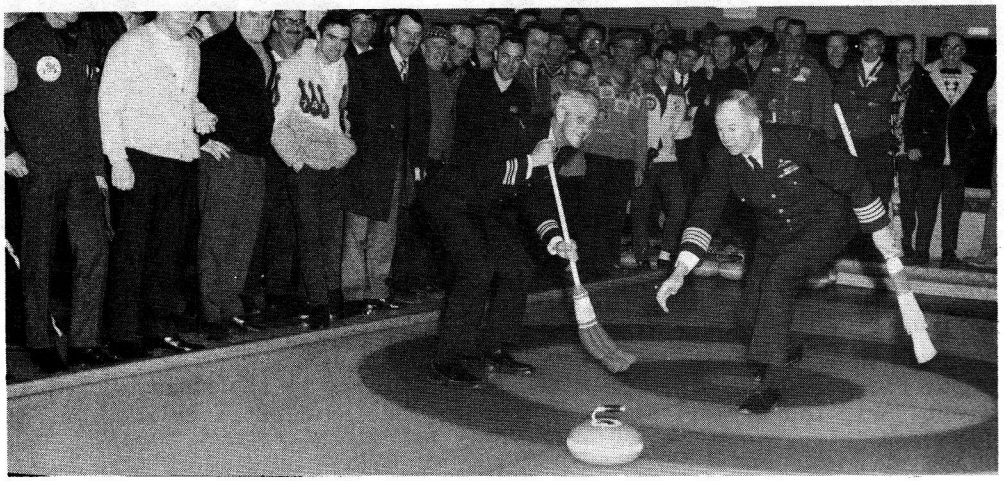
The "C" event was won by another rink from Base Maintenance, Borden, Skipped by John Quick, Vice Pat Patterson, Second Bob Ball and Lead Mike Trudeau. They were awarded the 8 Coy RCEME - 2 Fd Wksp Trophy.

The "D" event was won by a rink Skipped by Wes Kirkby, Vice Neil Oglestone, Second Leonard and Lead Ted McWilliam, from Land Maintenance Uplands, Ontario.

Teams placing second were, "A" event - the Doug MacLennon rink from Petawawa; "B" event - the Al Gorman rink from CFSAOE, Borden; "C" event - the Marcel Simonin rink from Ottawa and "D" event - the Rocky Rochefort rink from CFB London.

The curlers gathered at Bldg T-65 on Saturday evening where a good time was had by all, and an excellent buffet was served.

The spiel wound up at 1700 hrs 28 Mar 71 with the awarding of the trophies and prizes. A small buffet was enjoyed by everyone, and all curlers proceeded home to their various stations, happy and tired, and looking forward to next years Bonspiel which will be hosted by CFSAOE at CFB Borden. SEE YOU NEXT YEAR.



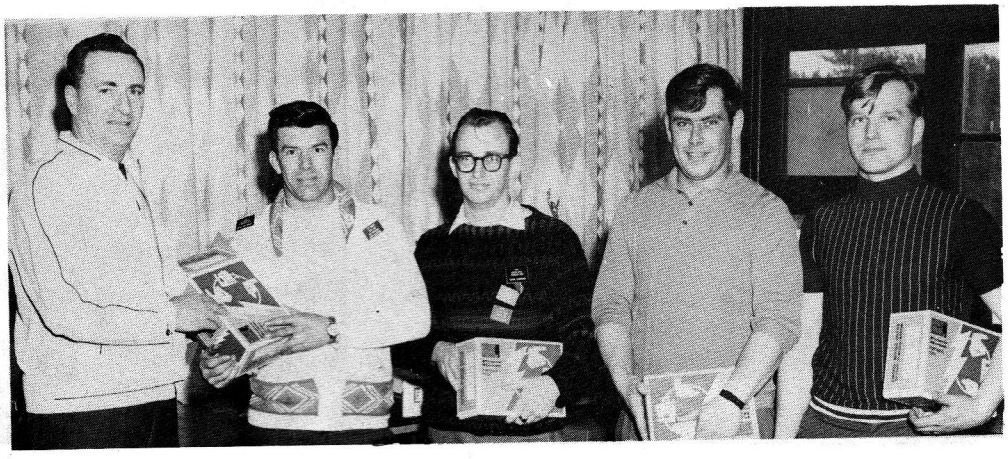
Col Middleton throwing the first rock which is swept by Maj Richards in the opening ceremony.

Major Richards presenting the 14 Coy RCEME Trophy to the winners of "A" event. Skip Red Sturgess, Vice Lee Doiran, Second Ken Wayner and Lead Roy Smith.

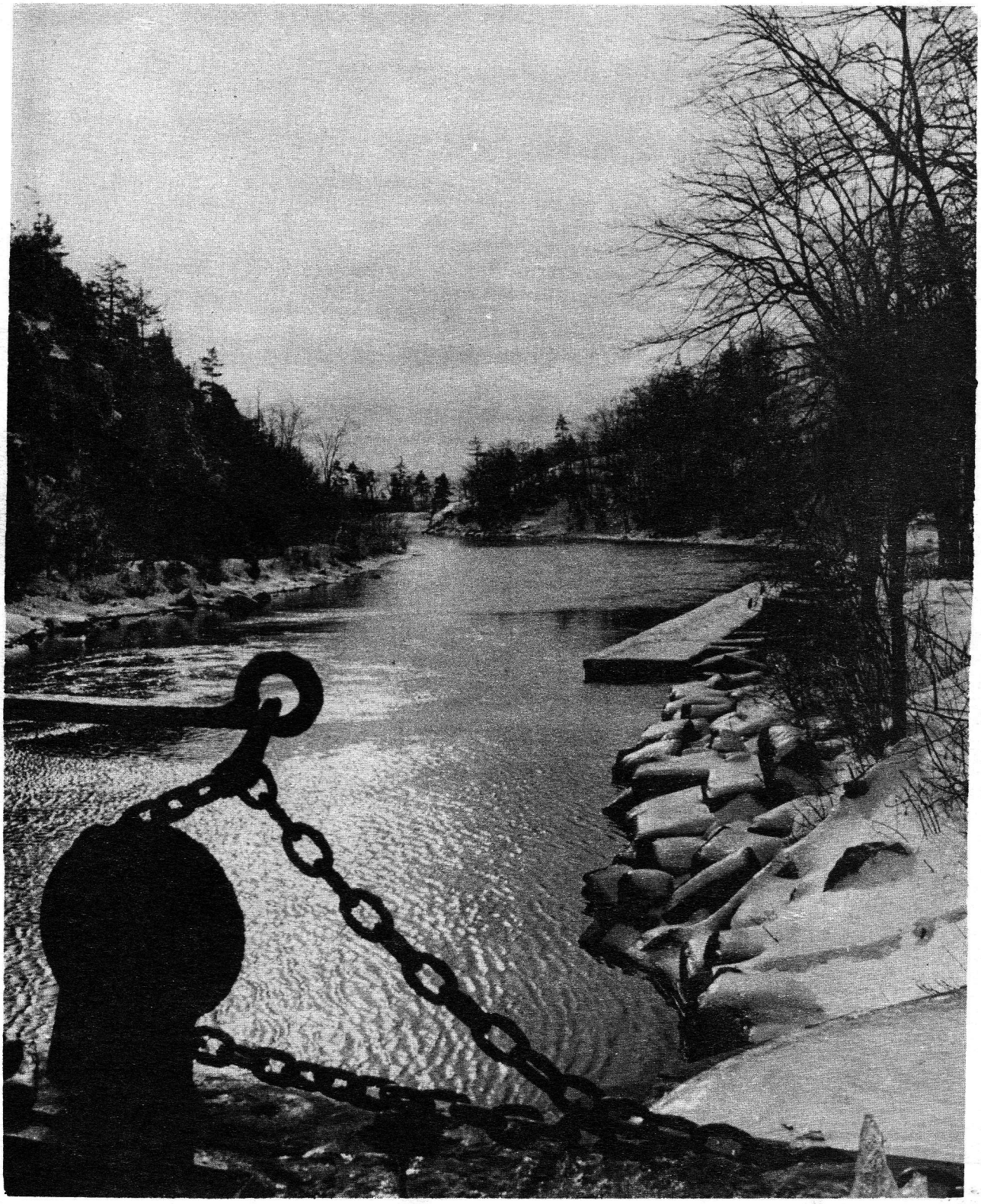
Major Fischer presenting The RCEME School Trophy to the winners of "B" event. Skip Lou Barker, Vice Mel Pounder, Second Alex Lascelles and Lead Bob Ewing.

Lt Hartwick presenting the 8 Coy RCEME - 2 Fd Wksp Trophy to the winners of "C" event. Skip John Quick, Vice Pat Patterson, Second Bob Ball and Lead Mike Trudeau.

Doug Pineau congratulating the winners of "D" event. Skip Wes Kirkby, Vice Neil Oglestone, Second Leonard and Lead Ted McWilliam.



Capt Clarke presenting the team that placed second in "A" event with their prizes. Skip Doug MacLennon, Vice Doug Cosman, Second Al Webber and Lead Al McCooey.

MWO Duffy congratulating the team that placed second in "B" event. Skip Al Gorman, Vice Bill Leslie, Second Mel Stoney and Lead Bob Fischer.

HAVE YA EVER HAD THAT FEELING?